

INDIA

RUBBER WORLD

SYNTHETIC

DECEMBER, 1946

TECHNOLOGY DEPT
DEC 30 1946
OFFICE

spheron 6

Tire manufacturers are using increasing amounts of Cabot Spheron 6 (MPC)* due to the return of natural rubber. The two developments are parallel. For with the reappearance of crude rubber, a different grade of channel black is required. That black is Spheron 6. Sustained quality explains the demand, and to meet it Cabot is making more and more of this superior black.

CABOT

*Medium Processing Channel

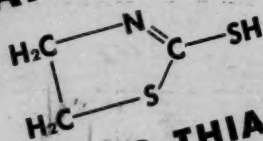
GODFREY L. CABOT, INC., 77 FRANKLIN ST., BOSTON 10, MASS.

LOW HEAT BUILD-UP AND MORE TIRE MILEAGE WITH ...



**DU PONT
ACCELERATOR**

2-MT



(2-MERCAPTO-THIAZOLINE)

ADVANTAGES OF 2-MT OVER THIAZOLES AS SHOWN IN TIRE VULCANIZATES

Rubber stocks accelerated with 2-MT exhibit the following good qualities:

1. Exceptionally low heat build-up.
2. Practically no tendency to revert and exhibit other undesirable effects of long curing.
3. Excellent resistance to heat and aging.
4. Extraordinary retention of tensile strength, extensibility and resistance to tear, at elevated temperatures.
5. Conspicuous resistance to flex cracking.

Data accumulated from laboratory, plant and road tests prove beyond a doubt that the exceptional quality imparted by 2-MT to natural rubber compounds results in vastly improved truck tire performance. The outstanding advantages of 2-MT are the low heat build-up and the remarkable heat and age resistance that it imparts to stocks without resorting to low sulfur ratios. All of these plus values can be translated into higher mileage and longer life for your tires.

Accelerator 2-MT (thiazoline) shows advantages over MBT (thiazole) similar to those which the thiazoles provided over earlier types of accelerators.

The structural formula of 2-MT shown above reveals some relationship to mercapto benzo thiazole, but in its behavior the following favorable differences will be observed:

1. At vulcanizing temperatures below 267°F. its speed and strength are equal but at higher temperatures it is a slightly stronger and faster accelerator.
2. The modulus curve of stocks accelerated with straight 2-MT is slightly steeper. However, when the 2-MT is activated with a

guanidine or an aldehyde amine, the modulus curve is flatter.

3. 2-MT is less acidic than MBT. Consequently it can be activated with guanidines or aldehyde amines with greater safety at processing temperatures.
4. Also because 2-MT is less acidic, the use of Retarder W or other organic acids such as stearic acid has greater retarding effect at processing temperatures. However, at vulcanizing temperatures (above 267°F.) this action is reversed and Retarder W activates acceleration. Although rubber compounds having the most desirable physical qualities will be obtained by the use of 2-MT without secondary acceleration, activation with a guanidine or with an aldehyde amine such as Accelerator 808 results in faster cures.

Rubber Chemicals Division

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT RUBBER CHEMICALS

BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY



PERMANENT RESILIENCE

Resilient parts made from HYCAR synthetic rubber *stay* resilient. That's partly because of HYCAR's unusual chemical stability—its resistance to oil and gas, acids and most other chemicals. And parts made from HYCAR are extremely resistant to the effects of oxidation, sunlight, and normal aging. A HYCAR sealing ring, for example, will maintain a positive seal through years of service even when constantly exposed to oils and acids inside the pipe, and sunlight and salt air outside.

Other unusual and valuable properties are listed in the box at the right. But most important, these properties

may be had in an almost limitless number of combinations, each designed to meet the specific service conditions of the finished part. Parts made from HYCAR have seen service in every industry, giving long life, dependability, and economical operation.

That's why we say ask your supplier for parts made from HYCAR. Test them in your own applications, difficult or routine. You'll learn for yourself that it's wise to use HYCAR for long-time, dependable performance. For more information, please write Dept. HC-12, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

CHECK THESE SUPERIOR FEATURES OF HYCAR

1. EXTREME OIL RESISTANCE — insuring dimensional stability of parts.
2. HIGH TEMPERATURE RESISTANCE—up to 250° F. dry heat; up to 300° F. hot oil.
3. ABRASION RESISTANCE—50% greater than natural rubber.
4. MINIMUM COLD FLOW—even at elevated temperatures.
5. LOW TEMPERATURE FLEXIBILITY—down to -65° F.
6. LIGHT WEIGHT—15% to 25% lighter than many other synthetic rubbers.
7. AGE RESISTANCE—exceptionally resistant to checking or cracking from oxidation.
8. HARDNESS RANGE—compounds can be varied from extremely soft to bone hard.
9. NON-ADHERENT TO METAL—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)

Hycar

Reg. U. S. Pat. Off.

LARGEST PRIVATELY PRODUCED BUTADIENE TYPE

American Rubber

B. F. Goodrich Chemical Company

A DIVISION OF
THE B. F. GOODRICH COMPANY

This advertisement appeared in a long list of carefully selected business papers TO HELP YOU SELL parts made from HYCAR.

**LET PHILBLACK A
PLAY SANTA CLAUS
to your rubber products!**



And here are some of the "Christmas presents"
Philblack A wants to give you . . .

EASY PROCESSING

HIGH RESILIENCE

LOW HYSTERESIS

RESISTANCE TO ABRASION

LOWER HEAT GENERATION

SMOOTH, EASY EXTRUSION

PLIANT: SPLICES WELL

HIGHER SHORE HARDNESS

IMPROVED TEAR RESISTANCE

SMOOTH CALENDERING

EXCELLENT MOLD FLOW

For an extra happy New Year . . . use Philblack A!

PHILLIPS PETROLEUM COMPANY

Philblack  *Division*

EVANS SAVINGS AND LOAN BUILDING • AKRON 8, OHIO

"Ver'sa-tile —Turning with ease
from one thing to another; having
many aptitudes; many-sided;
as versatile genius . . ."—Webster

THAT IS WHAT WE MEAN ABOUT...

TUEX

(Tetramethylthiuram disulfide)

1. Primary Accelerator in Natural Rubber or GR-S, without sulfur
2. Secondary Accelerator in Natural Rubber or GR-S, with sulfur
3. Primary Accelerator in Butyl Rubber, with thiazoles and sulfur

PROPERTIES

- Non-Staining and Non-Discoloring
- Safe Processing
- Superaging when used without sulfur
- Activates Thiazoles, Aldehydeamines, Guanidines

PRODUCTS

Wire Insulation • Tubes, Natural or Butyl • Drug Sundries
Mechanicals • Proofing • Footwear • Sponge Rubber
Transparent Gum Stocks

PROCESS • ACCELERATE • PROTECT with **NAUGATUCK CHEMICALS**

NAUGATUCK

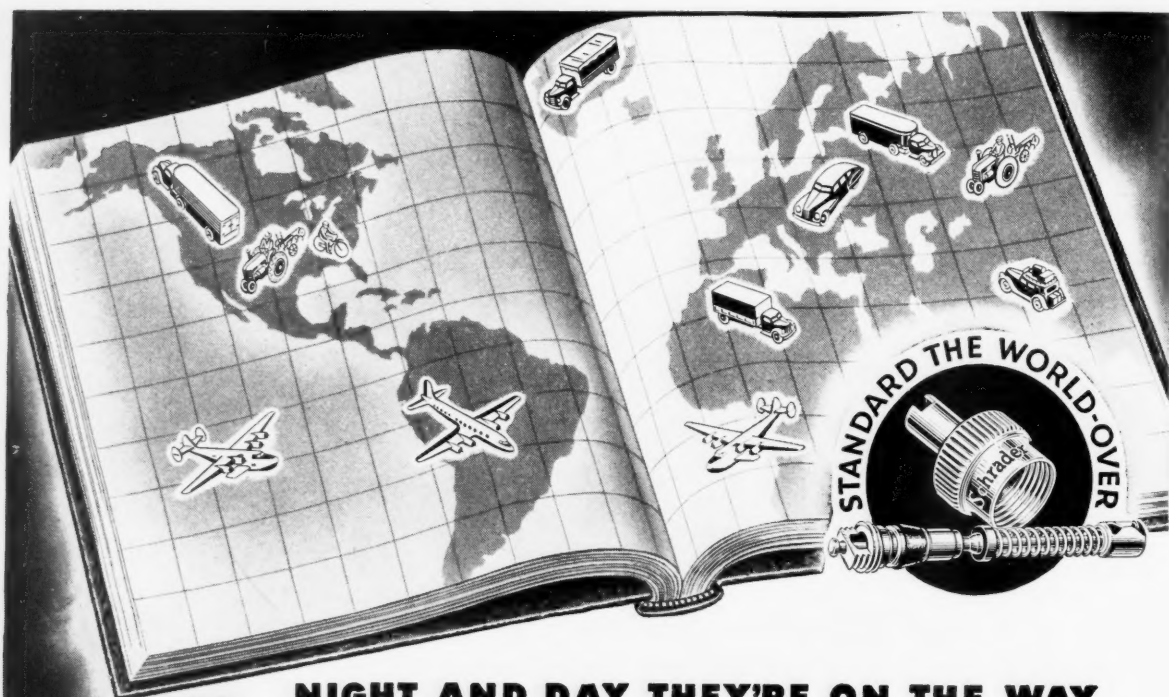


CHEMICAL

Division of United States Rubber Company

1230 AVENUE OF THE AMERICAS, NEW YORK 20, N. Y.

IN CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ont.



**NIGHT AND DAY THEY'RE ON THE WAY
ACROSS THE WORLD . . .**

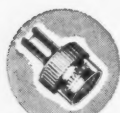
WORLD FAMOUS SCHRADER PRODUCTS!

● 24 hours a day, 365 days a year, in every country in the world, Schrader Products are serving the transportation industry, the motoring and bicycling public, and the farmer.

The motor freight that rolls along the Alaskan Highway, the taxi that chugs up the Khyber Pass, the plane that soars over the Andes, and the tractor that pulls the plow across our own country's far-flung acreage all depend on Schrader precision-engineered valves and accessories for top tire performance and economical operation.

Scientifically-built Schrader Cores make tire valves absolutely air-tight under every operating condition . . . and neither the incessant pounding of a truck tire over rocky terrain nor the sudden impact of a plane's tire on the concrete runway can budge a Schrader Cap once it's put on finger-tight.

Similarly, the accuracy of Schrader Gauges, the efficiency of Schrader Vulcanizers, the durability of all other Schrader Tire Valve Tools and Equipment have won the respect and admiration of jobbers, dealers and users alike.



Valve Caps



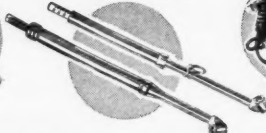
Tire Valves



Valve Cores



Air Pressure Gauges



Spark Plug Pumps



Blow Guns

ONE SOURCE

ONE RESPONSIBILITY

A. SCHRADER'S SON, Division of Scovill Manufacturing Company, Inc., BROOKLYN 17, N. Y.
ORIGINATORS OF THE COMPARATIVE AIR LOSS SYSTEM FOR FLAT TIRE PREVENTION

GOOD-RITE ERIE



an outstanding accelerator for
low heat build-up in
compounding GR-S and natural rubber

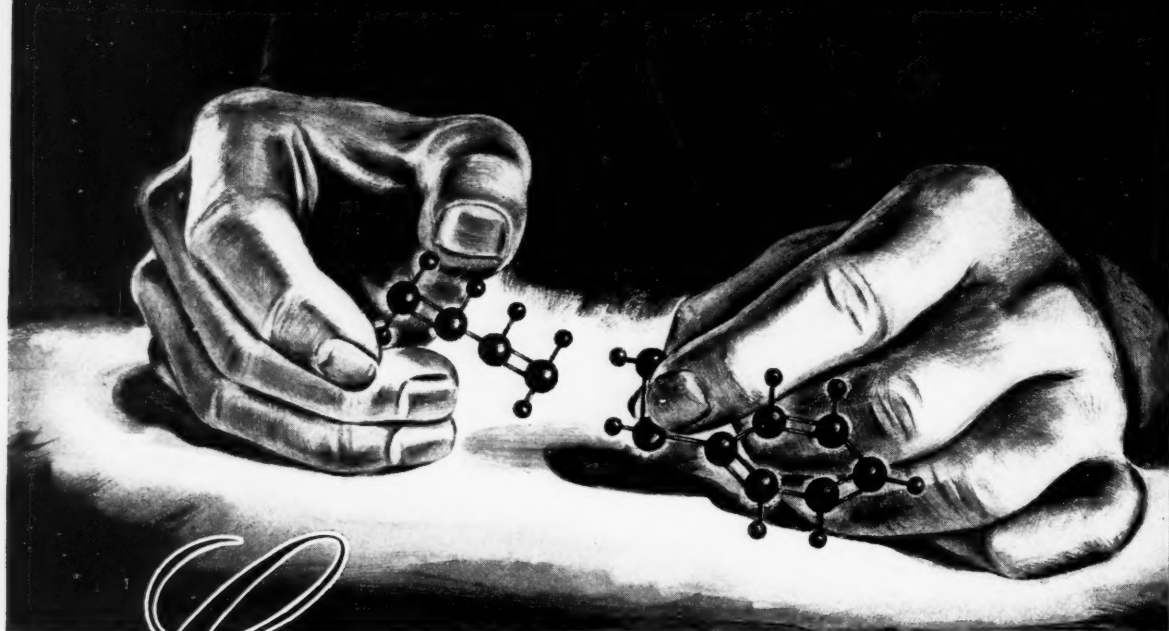
For technical data please write Dept. RA-12

B. F. Goodrich Chemical Company

A DIVISION OF
THE B. F. GOODRICH COMPANY

ROSE BUILDING, CLEVELAND 15, OHIO

SYNTHETIC RUBBER & RESIN COMPOUNDS



Custombuilt

FOR YOUR PRODUCT OR PROCESS

A few Applications of GENERAL LATEX Product Development

Aircraft Cements
Carpet Backing
Can Sealing
Cable and Wire
Combining Compounds
General Adhesives
Hose and Belting
Impregnating Compounds
Pile Fabrics
Protective Clothing
Shoe Adhesives
Sizings

A practical approach to the use of synthetic dispersions in your product is to refer your problem to our laboratory. No matter what the process—coating, impregnating, or bonding—our experienced technical staff can compound the material best suited to your requirements. In the case of an entirely new product, we will work out all the details of manufacturing procedure—from pilot operations to commercial production in your plant. Why not talk it over with one of our technical representatives?

GRS latex types 2 and 3, normal and concentrated, available from stock.

A Complete Service to Manufacturers

RESEARCH • MATERIALS • ENGINEERING • MANUFACTURE

General Latex & CHEMICAL CORP

666 MAIN STREET, CAMBRIDGE, MASS.

Agents for Rubber Reserve Company for storage and distribution of natural rubber latex. Distributors for Rubber Reserve Company for synthetic latex. Operators of the Government-owned Paytown, Texas, synthetic rubber plant in collaboration with the General Tire & Rubber Co.

Batch Stripping Improved by new Taylor Control System

HERE is a new Taylor Coordinated Control System that should facilitate any batch stripping operation.

By automatically regulating pumps and valves where necessary it permits the removal, at a controlled rate, of lower boiling constituents from various liquid combinations. At one of the synthetic rubber plants, where it is being used to recover butadiene and styrene from the special latex batches, efficiency is materially improved and operating attention minimized.

Here is what the new system does. First, a **Taylor Fulscope Time Schedule Controller**:

1. Strips butadiene from the unit at a controlled rate.
2. Automatically changes pumps at a given point in the cycle.

3. Removes vapors from the stripping unit until a minimum point is reached.

4. Automatically opens control valve to the styrene recovery unit.

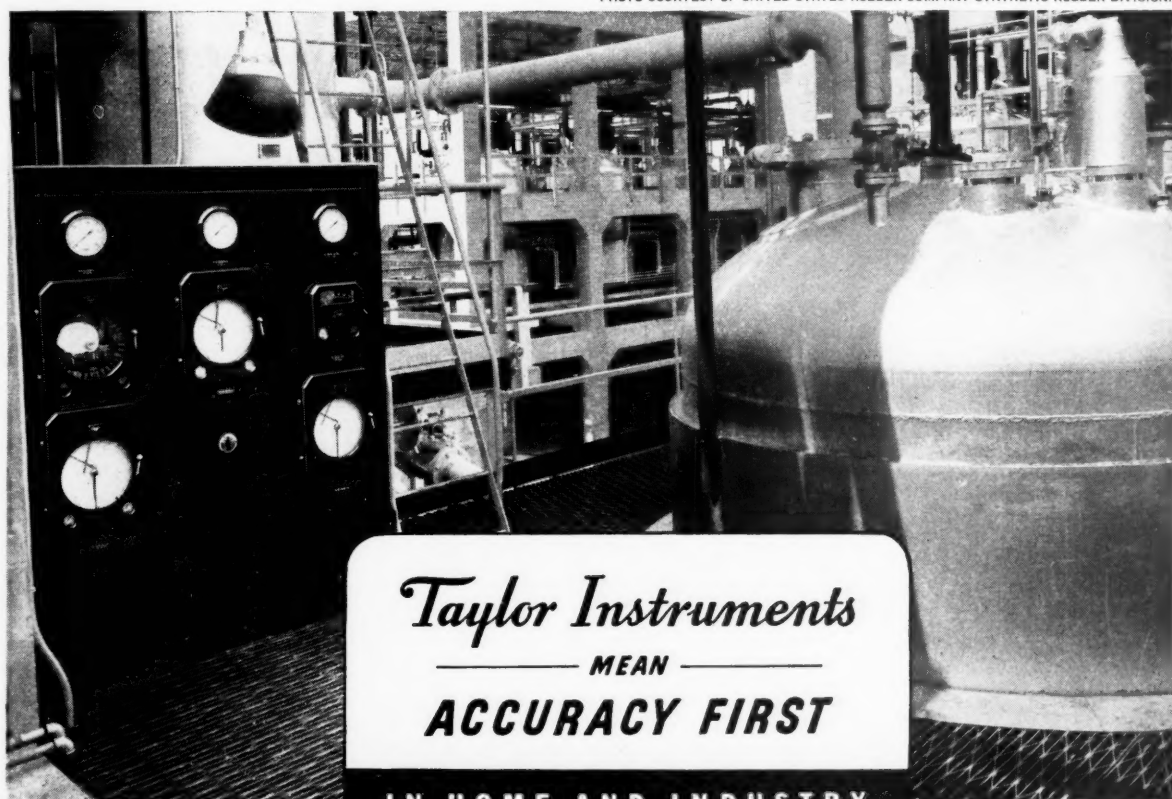
5. Signals operator when steam can be used for heating and driving off styrene.

Then, **manually set Fulscope Controllers** regulate steam flow and pressures to continue the operation.

This is just one of the many Taylor Control Systems we've designed to help you improve quality and increase efficiency. Ask your Taylor Field Engineer or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

PHOTO COURTESY OF UNITED STATES RUBBER COMPANY SYNTHETIC RUBBER DIVISION.



Taylor Instruments

— MEAN —

ACCURACY FIRST

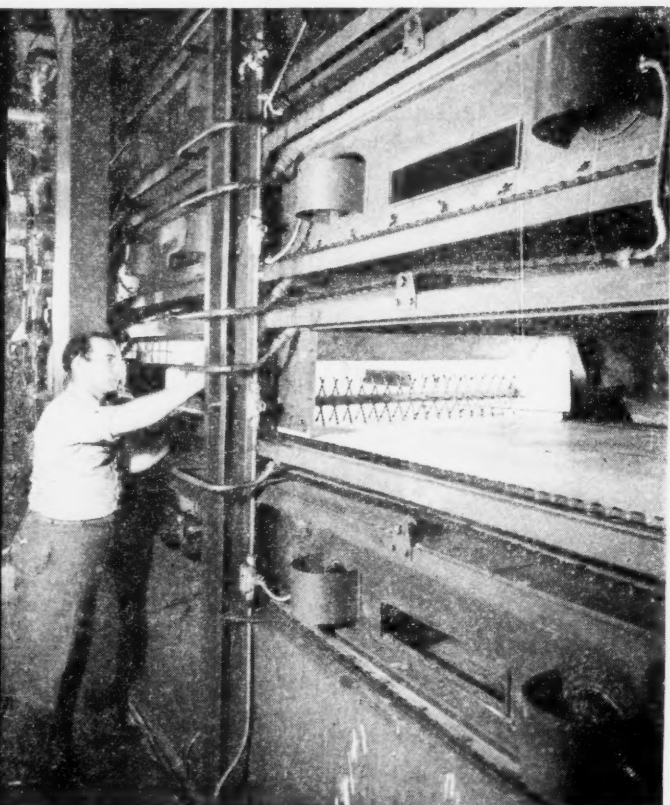
IN HOME AND INDUSTRY



withstand heat
resist oxidation
exclude moisture

SILASTIC-coated conveyor belts

**withstand 450° F.
in Birdseye
dehydrater**



PHOTO, COURTESY PROCESSES, INC

*Silastic endures an average air temperature of 450° F.
and heat radiated from coils containing Dowtherm at 650° F.*

In this machine invented by Clarence Birdseye for rapidly dehydrating foods without excessive surface hardening, heat applied by conduction, convection and radiation removes about 40% of the moisture content in the first six minutes. Uniformity of processing depends upon free movement of food along a succession of conveyor belts. That's where Silastic enters the picture. Belts of stainless steel wire cloth coated with Silastic have a smooth, odorless, tasteless, flexible and heat-resistant surface to which food particles do not readily adhere. This application is typical of the increasing industrial market for more heat-resistant materials. If you need rubber-like materials for a service too severe for organic rubbers, try Silastic. Ask for leaflet No. U 2-2.

*TRADE MARK, DOW CORNING CORPORATION

DOW CORNING CORPORATION • MIDLAND, MICHIGAN

Chicago Office: Builders' Building Cleveland Office: Terminal Tower

New York Office: Empire State Building

In Canada: Dow Corning Products Distributed by Fiberglas Canada, Ltd., Toronto

In England: Albright and Wilson, Ltd., London

DOW *orning*

FIRST IN SILICONES

RLD



INC

TON

READY!



Every pound of UNITED BLACKS is ready when it leaves the plant for an exacting job ahead. A wealth of manufacturing experience, together with careful supervision and scientific control, has made UNITED BLACKS the talk of the rubber industry for enviable performance. So,—standardize on UNITED BLACKS for top quality, uniformity, and dependability.



UNITED CARBON COMPANY, INC.

CHARLESTON 27, W. VA.

NEW YORK • AKRON • CHICAGO

DESIGNED FOR HANDLING



UNITED BAGS claim attention everywhere with their distinctive colored markings. Each type—SRF, HMF, EPC—is the answer for the exacting compounder and is acclaimed for performance in the millroom and on the road. Standardize on UNITED BLACKS to attain perfection in rubber products.



RESEARCH DIVISION
UNITED CARBON COMPANY, INC.

Charleston 27, West Virginia

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G



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i
s

NOW a superior HIGH SOLIDS latex for general use

CHEMIGUM 101

HERE is a new butadiene-styrene (45-55 ratio) copolymer latex containing approximately 55% solids. It offers the following improvements:

1. Quick drying
2. Excellent physical properties — high tensile and elongation with good tear strength
3. Excellent stability, both mechanical and thermal
4. Extremely low water absorption
5. Non-staining

These are qualities that make CHEMIGUM 101 ideal in such diversified applications as wire insulation, dipped goods, foamed rubber and water-

CHEMIGUM 101 IS BETTER

- for **Dipped Goods** because of high solids content, quick-drying and physical characteristics
- for **Foamed Rubber** because of high solids content, low viscosity and mechanical stability
- for **Adhesives** because of quick-drying, stability and excellent physical characteristics
- for **Wire Insulation** because of low water absorption, quick-drying, excellent physical and electrical properties
- for **Water-Based Paints** because washability of emulsion-type wall paints is greatly improved by a mixture of CHEMIGUM 101. Penetration reduced, flexibility and toughness improved

based paints. Combined with GRS latices, it is highly useful in improving physical properties and processing characteristics.

CHEMIGUM 101 is available only as an uncompounded latex. For complete information, write: Goodyear, Chemical Products Division, Plastics and Coatings Dept., Akron 16, Ohio.

Chemigum (pronounced Kem-e-gum) — T.M. The Goodyear Tire & Rubber Company

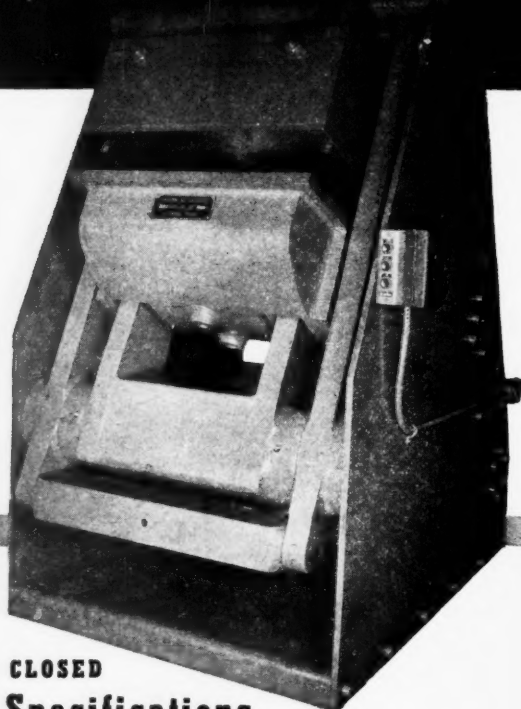
GOOD YEAR

THE GREATEST NAME IN RUBBER

STANMOCO

hydraulic toggle presses

**EQUIPPED WITH
KNOCKOUTS OFFER
BIG LABOR SAVINGS**



CLOSED **Specifications**

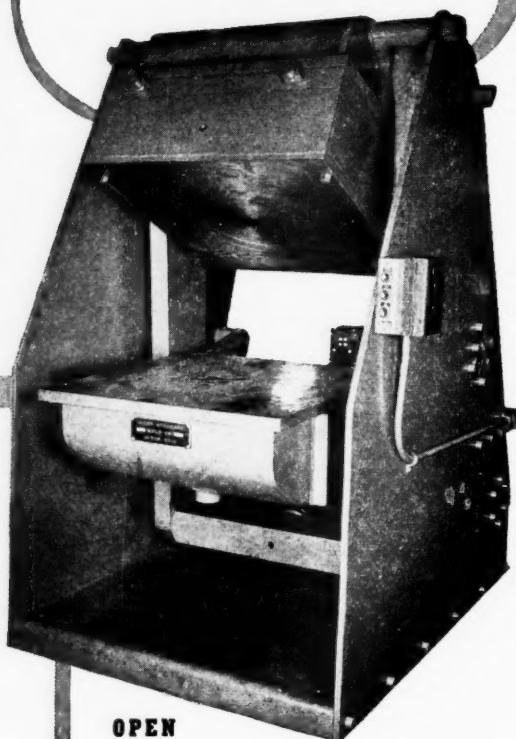
Platens 34"x 34"
Maximum Opening . . . 14½"
Pressure 200 Tons
Operation: Manual or automatic
through use of cycle timers.

Press designed for use with 750 pounds hydraulic oil pressure.

Press can be furnished with or without hydraulic pumping unit.

Special knockouts can be furnished to meet individual requirements.

Presses can be furnished complete with molds and knockouts for any special molding job.



OPEN

Write for complete details

The Akron Standard Mold Co.
Akron  Ohio



U. S. 140 . . sounds like an express highway — doesn't it? Well, this tested GRS WHOLE TIRE RECLAIM is an express highway to speedy, safe rubber compounding.



1. Free blending with GRS or natural rubber.
2. Smoothness and flatness.
3. Fast tubing.
4. Easy processing.

A generous sample — with full particulars — gladly sent on request.

U. S. RUBBER RECLAIMING CO., INC.

500 FIFTH AVENUE • NEW YORK 18, N. Y. (Plant at Buffalo, N. Y.)

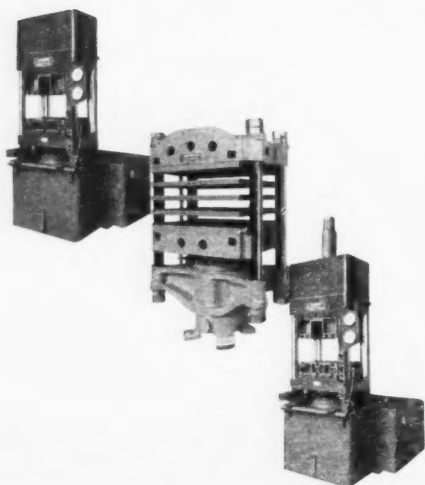
TRENTON...H. M. ROYAL, Inc., TORONTO...H. VAN DER LINDE, Ltd.,
689 Pennington Ave. 156 Yonge St.

64 Years Serving the Industry Solely as Reclaimers

Let's get our Heads Together



on your Hydraulic Press Problems



If there's ever a time when two heads are better than one, it's when an investment in new production equipment is being planned.

You'll find a Baldwin engineer a real help in matching up the right press with the right job.

The Baldwin Line offers a type and size for all ordinary needs and these presses offer an unusual combination . . . the economy of a standard design, with the production advantages of appealing "custom-built" features. The Baldwin Locomotive Works, Philadelphia 42, Pa., U.S.A. Offices: Philadelphia, New York, Boston, Cleveland, Chicago, Detroit, St. Louis, Houston, San Francisco, Birmingham, Pittsburgh, Washington, Norfolk.

BALDWIN
HYDRAULIC PRESSES



Reservoir for Industry

In drum or tank car lots . . . whether for construction or maintenance, processing or production . . . the reservoir of Flintkote Industrial Products offers many time-and-money-saving advantages.

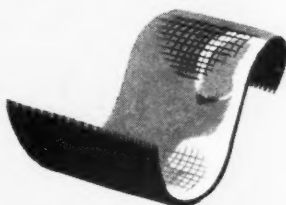
Tire cord solutioning is one of the many applications of Flintkote Syntex* aqueous dispersions of rubber.



An outstanding use of Flintkote Hydralt* coatings is the protection of steel against corrosion.



Flintkote fluid rubber compounds are used for rugs and carpet backing and also as saturants, coatings, and bonding cements.



All types of insulation require the kind of protection from the elements that Flintkote insulation coatings provide.

Fibre board for containers is made water-resistant with Flintsizet† added during manufacture.



Flintkote sound-deadening materials and industrial adhesives are important components of automobiles and many other consumer durable goods.

*TM Reg. U. S. Pat. Off.
†Trade-mark

A reservoir of supply for your needs. That's another way of describing Flintkote's complete research, development and manufacturing facilities. Let us help you. Write us today.

Flintkote-Products for Industry

THE FLINTKOTE COMPANY · INDUSTRIAL PRODUCTS DIVISION

Atlanta · Boston · Chicago Heights · Detroit · Houston



30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Los Angeles · New Orleans · Washington · Toronto · Montreal



For Hose . . .

or Tires . . .

or Telephone Wires . . .

"If it's made with RUBBER
...it's better made with RED LEAD"

PLENTY OF REASONS
FOR COMPOUNDING RUBBER
WITH #2 RM RED LEAD

1. Improved Heat Stability—Retention of Elasticity
2. Lower Heat Build-up—Cooler Running
3. Economical
4. Faster Curing Rate
5. Extended Curing Range
6. Excellent General Physical Properties
7. Safe Processing

Most rubber products...from tires for wheels to rubber heels...are better products if they're made with Red Lead.

Exhaustive tests, and the working experience of users, show that compounding rubber with #2 RM Red Lead brings very real advantages.

Check the seven benefits listed at the left. All of them are important in tire manufacture, but most apply in other fields too...no matter whether you're working with GR-S, GR-S-10, GR-M, GR-A, GR-I, natural rubber or vinyl elastomers.

Technical literature and counsel on your specific application will be supplied upon request to the Rubber Division of our Research Laboratories, 105 York Street, Brooklyn 1, N. Y.



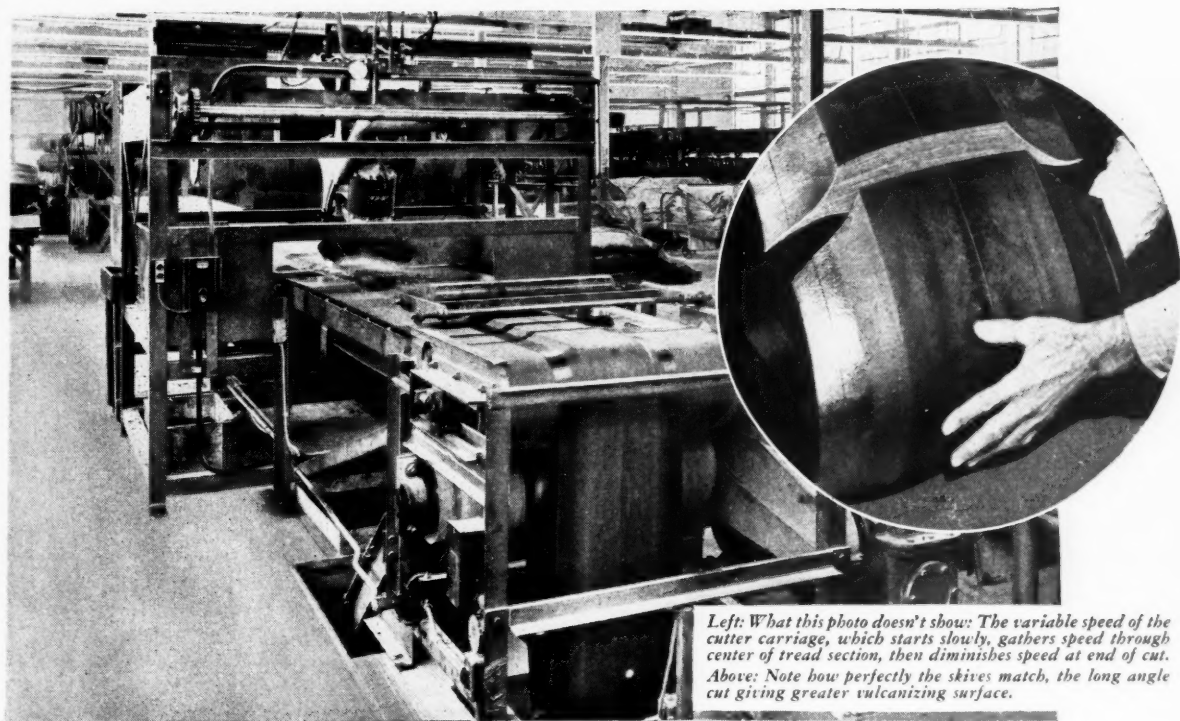
NATIONAL LEAD COMPANY

New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, West Virginia, (Evans Lead Division).

Designed For Accuracy!

Save Time, Material, Labor with the New

NRM MODEL 46 TREAD SKIVER



Left: What this photo doesn't show: The variable speed of the cutter carriage, which starts slowly, gathers speed through center of tread section, then diminishes speed at end of cut. Above: Note how perfectly the skives match, the long angle cut giving greater vulcanizing surface.

WE wish we could show you a movie which would tell more quickly than words . . . how smoothly and accurately the new NRM Model 46 Tread Skiver goes about its job.

First, you'd see that this machine skives on the fly, in one direction only, with a big 20" diameter blade. Although it's water-lubricated, you'd notice there's no wasting of water. Following the cut tread sections down the line, a close-up picture of a skive would show the steep angle of the clean cut, (variable from 15° to 45°) which matches perfectly

the skive at the other end of the tread section.

Farther down the conveyor line you would see why recutting is a waste practice of the past, for check measurements of the tread sections do not vary more than 1/8".

Well, we haven't a motion picture showing all this, and the many other advantages of the NRM Tread Skiver, so the next best step is to send you a complete technical description of the equipment and its performance record in actual production . . . Write for this additional information today.

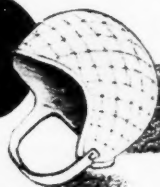
NATIONAL RUBBER MACHINERY CO.

General Offices: AKRON 11, OHIO

*Creative
Engineering*

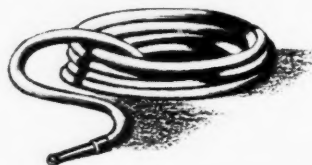
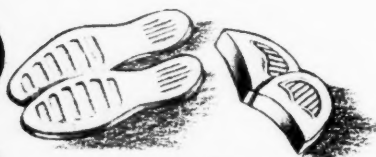
TITANOX ... *the brightest name in titanium pigments*

TITANOX...



the right choice for

WHITE products



*I*n natural or synthetic rubber, TITANOX imparts a whiteness that adds attractiveness and sales-appeal to products. A little of it goes a long way in accomplishing high whitening and strong brightening with a minimum of pigmentation.

TITANOX is effective, not only for white rubber but also for tinted stocks to which it brings tones and colors that are remarkably clear.

The good working qualities of TITANOX have resulted in a demand much greater than the output. So, if you can't get all the TITANOX you want, please bear with us. In the meantime, everything possible is being done to increase production.

TITANOX

TRADE MARK

111 Broadway, New York 6, N. Y.
104 So. Michigan Ave., Chicago 3, Ill.

TITANIUM PIGMENT CORPORATION
SOLE SALES AGENT

350 Townsend St., San Francisco 7, Cal.
2472 Enterprise St., Los Angeles 21, Cal.



Fabric Uniformity Smooths the Way

When yard after yard of fabric passes through your calendering machines with never a hitch . . . with every area uniformly calendered, quality improves, production soars and costs plunge. Uniformity in the fabrics used smooths the way to such production.

That is why every step in the spinning and weaving of Mt. Vernon fabrics is rigidly controlled by laboratory tests to insure greater uniformity. For fabric quality that means top quality in your products, specify Mt. Vernon fabrics.



TURNER HALSEY

COMPANY
Selling Agents

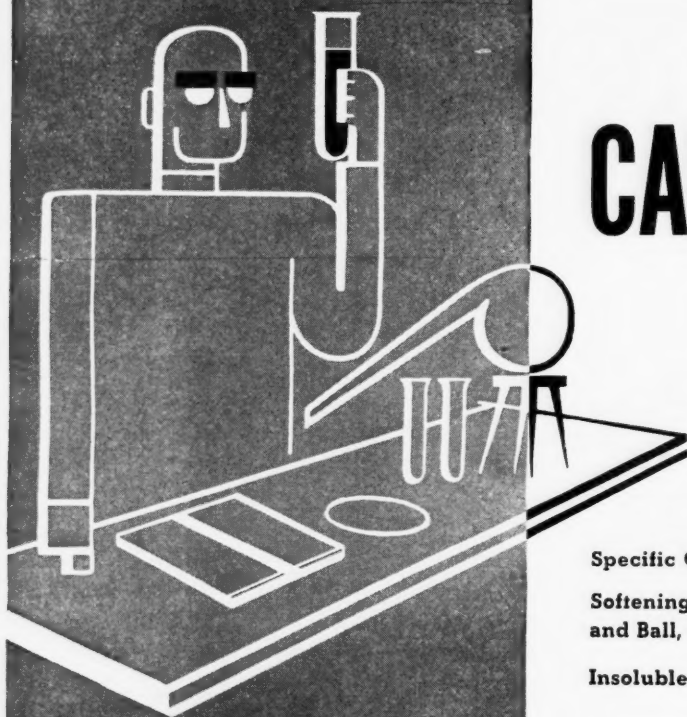
40 WORTH ST. • NEW YORK

Mt. Vernon-Woodberry Mills

Branch Offices: CHICAGO • NEW ORLEANS • ATLANTA • BALTIMORE • BOSTON • LOS ANGELES • AKRON

FROM THE CATALOG OF BARRETT

RUBBER COMPOUNDING MATERIALS...



CARBONEX^{*} S

Carbonex S is a solid hydrocarbon derived from Coal Tar, and modified with a small amount of fatty acid. It is produced and shipped in flake form.

SPECIFICATIONS

Specific Gravity @ 25C / 25C 1.28 to 1.38

Softening Point, Ring and Ball, in Glycerine Deg. Fahr. 210 to 225

Insoluble in Benzene % by Weight 40.0 to 44.0

Carbonex S may be classified as a reinforcing softener containing a small amount of fatty acid which is available as such in compounding. Carbonex S serves as a plasticizer in the uncured stock at normal processing temperatures and as a reinforcing agent in the vulcanizate. It is particularly effective in the design of stocks for extrusion. Carbonex S also confers good flow and smooth finish in molded compounds.

Available in: Cotton bags containing 100 lbs. of material, up to carloads.

THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd.,
6551 St. Hubert Street, Montreal, Qué.

^{*}Reg. U.S. Pat. Off.

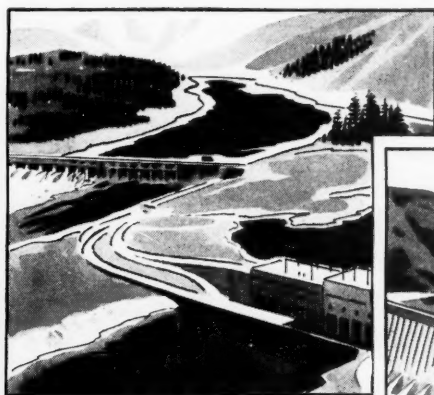


A MESSAGE TO THE RUBBER INDUSTRY

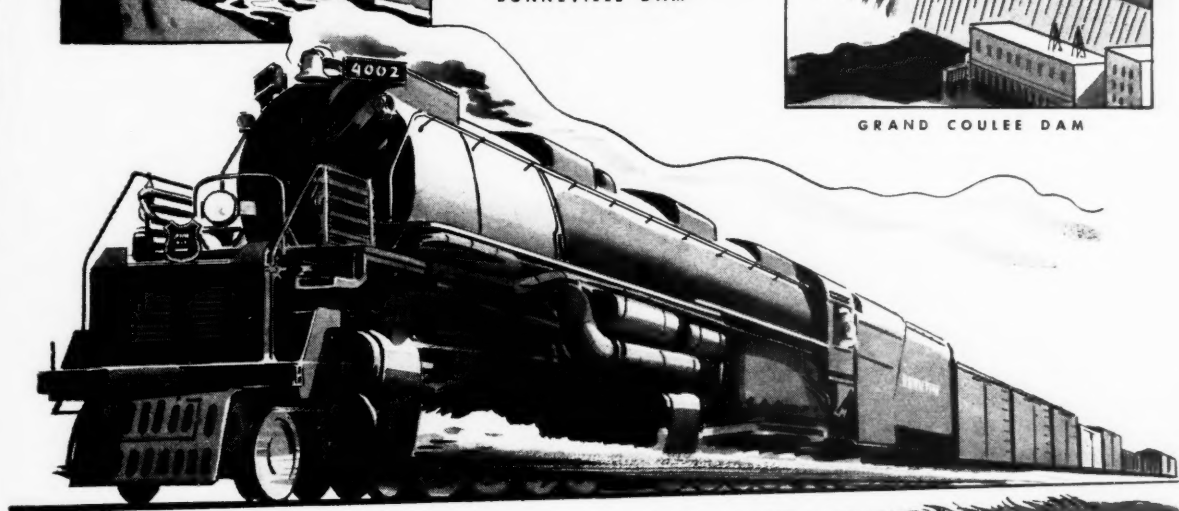
BOULDER DAM



BONNEVILLE DAM



GRAND COULEE DAM

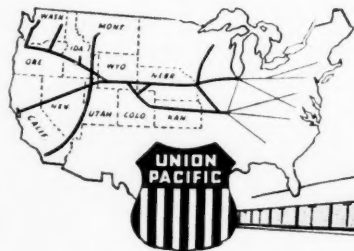


More POWER
to you

Three great dams, harnessing the natural force of the Colorado and Columbia Rivers, provide tremendous industrial power.

Giants of the rails, the Union Pacific "Big Boy" locomotives provide freight transportation power over the Strategic Middle Route.

Power, light, and efficient transportation . . . combined with a wealth of raw materials and adequate "growing space" . . . offer unusual opportunities for industry in the Union Pacific West.



be Specific -
say "Union Pacific"

★ Union Pacific will gladly furnish confidential information regarding available industrial sites having trackage facilities in the territory it serves. Address Industrial Dept., Union Pacific Railroad, Omaha 2, Nebraska.

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The Strategic Middle Route



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● Why worry over the weatherman's predictions for December if your feet are protected by warm, waterproof, light weight, good fitting rubber footwear.

Reclaimed rubber in footwear stocks smooths production and gives uniform high quality to the product.

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- Extra heavy housings and totally enclosed piping with all exposed surfaces smooth for easy cleaning.
- Precision roll adjustment mechanism, with slack take-up, arranged for use with automatic gauging equipment.
- Adamson bearing design for high temperature operation with ample flow of filtered lubricant around the roll journals. Original anti-leak design of oil seals retains lubricant in bearings. Conditioning of lubricant insures uniform oil film thickness.
- Roll diameter and lengths are selected for each particular job. Various roll combinations are available.

Write for complete technical data, or consult our engineers concerning special rubber or plastics machinery or processes.

* Adamson United is staffed to engineer and furnish complete calendering process systems for either Rubber or Plastics, including all accessory equipment, such as

**FABRIC DRYING
EXPANDER ROLLS
GUIDING DEVICES
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with associated coordinated drives.

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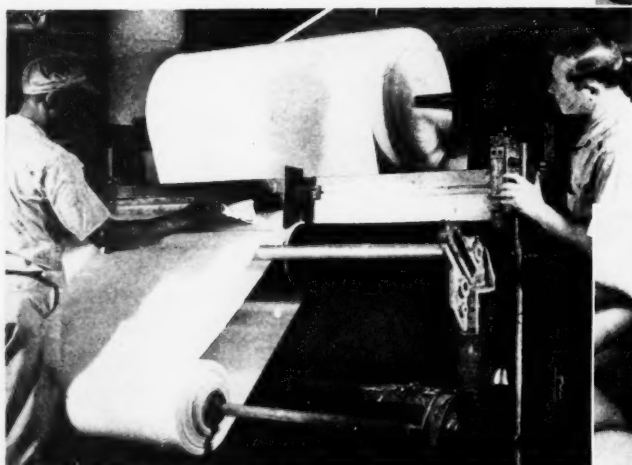
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Plants at: PITTSBURGH · VANDERGRIFT · NEW CASTLE · YOUNGSTOWN · CANTON

The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment.

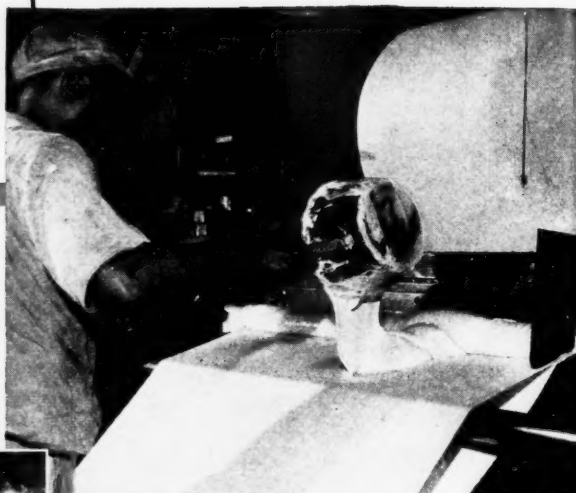
ONE SHOT COMBINING

**Bone Dry Lamination . . .
Maximum Speed of Production . . .**



▲ Wet Combining in process in same Can Drier operation. Note rolling bank of UBS Combining Cement at knife and high solids film deposit of sufficient depth to enable wet stick.

UBS compounded GR-S Latex Combining Cement provides a positive, *one coat* bond, good flexibility, and excellent moisture resistant and ageing qualities. ▶



▲ Application of UBS compounded GR-S Latex Combining Cement to fabric at coating knife. Note heavy viscosity and body, enabling efficient handling and application.



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BUT NOT ANYMORE!**

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GR-A

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GR-S

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GR-N



SYNTHETIC RUBBER helped win the war—but, oh brother! it brought a lot of headaches, too.

For synthetics changed a simple sorting process into a complex problem. Only painstaking checking and rechecking, much like they do in laboratories, can

hope to do the job successfully from this point on.

As long as there's a use for synthetic rubber—and we believe it's here to stay—we'll continue to give freely of the extra time and energy the job demands...so that *you* can be sure of what you're getting.

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ABOUT

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ROPEN'S NEW MARKETS

ANOTHER HERCULES
CONTRIBUTION TO
BETTER RUBBER

Now the same tough, long-wearing rosin rubber that produces today's better tires brings its superior all-around physical properties to many rubber products made from non-black pigmented stocks.

Tests conducted at Hercules rubber laboratory, and by outside concerns, demonstrate that, in colors other than black, this new rosin rubber is superior to comparable stocks of regular GR-S in all the properties listed at left, and in their relative ease of compounding and calendering. The superiority of rosin rubber is largely due to the presence of resin acids produced by the coagulation of Hercules Dresinate* 731 in the rubber, resulting in better pigment dispersion and wider latitude in compounding recipes.

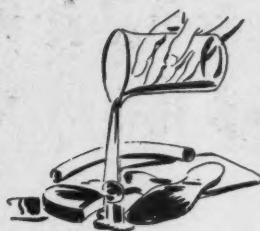
In addition, the rubber industry has developed modifications of the GR-S-10 rosin rubber recipe, which are non-staining and non-discoloring. These modifications open new fields to synthetic rubber, heretofore closed by the necessity of incorporating carbon black in GR-S compounds.

If you make rubber or rubber products, write for "Rosin Rubber—the Story of Dresinate 731."

*Reg. U. S. Pat. Off. by Hercules Powder Company

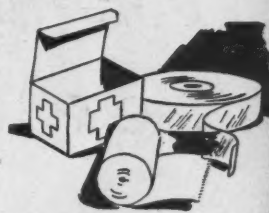
CHEMICAL MATERIALS FOR
THE RUBBER INDUSTRY

**Hercules chemical materials
for the rubber industry include:**



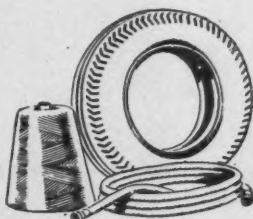
Solvenol* ...

A strong solvent for rubber, with a slow rate of evaporation. Widely used in rubber reclaiming.



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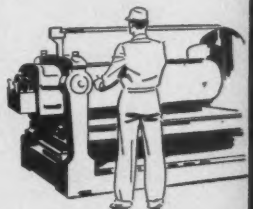
Dresinate* 731 ...

One of Hercules' many resin derivatives, Dresinate 731 is the emulsifying agent used to make GR-S-10.



Nitrocellulose ...

Hercules nitrocellulose and ethyl cellulose provide lacquers of maximum adhesion, durability, gloss, and color.



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Odorless, non-staining softeners for natural rubber.

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DETAILS**



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Please send your book on rosin rubber. We are interested in rosin rubber for _____

Name _____

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Company _____

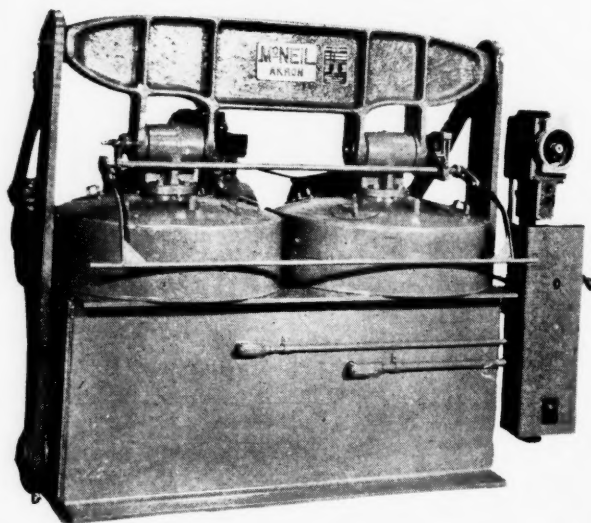
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This strictly modern electrically operated twin press for bicycle tires or tubes closes in approximately three seconds and automatically inflates the curing bag the instant the two mold halves are together.

The press is 68" wide between the side arms and is good for 40,000 lbs. in each mold position. Furnished complete with drilled steel steam platens for the use of ordinary two or three piece molds. The upper platen is easily adjustable to suit mold thickness.



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Handles either the old style single tube or the more modern straight side type of bike tire.

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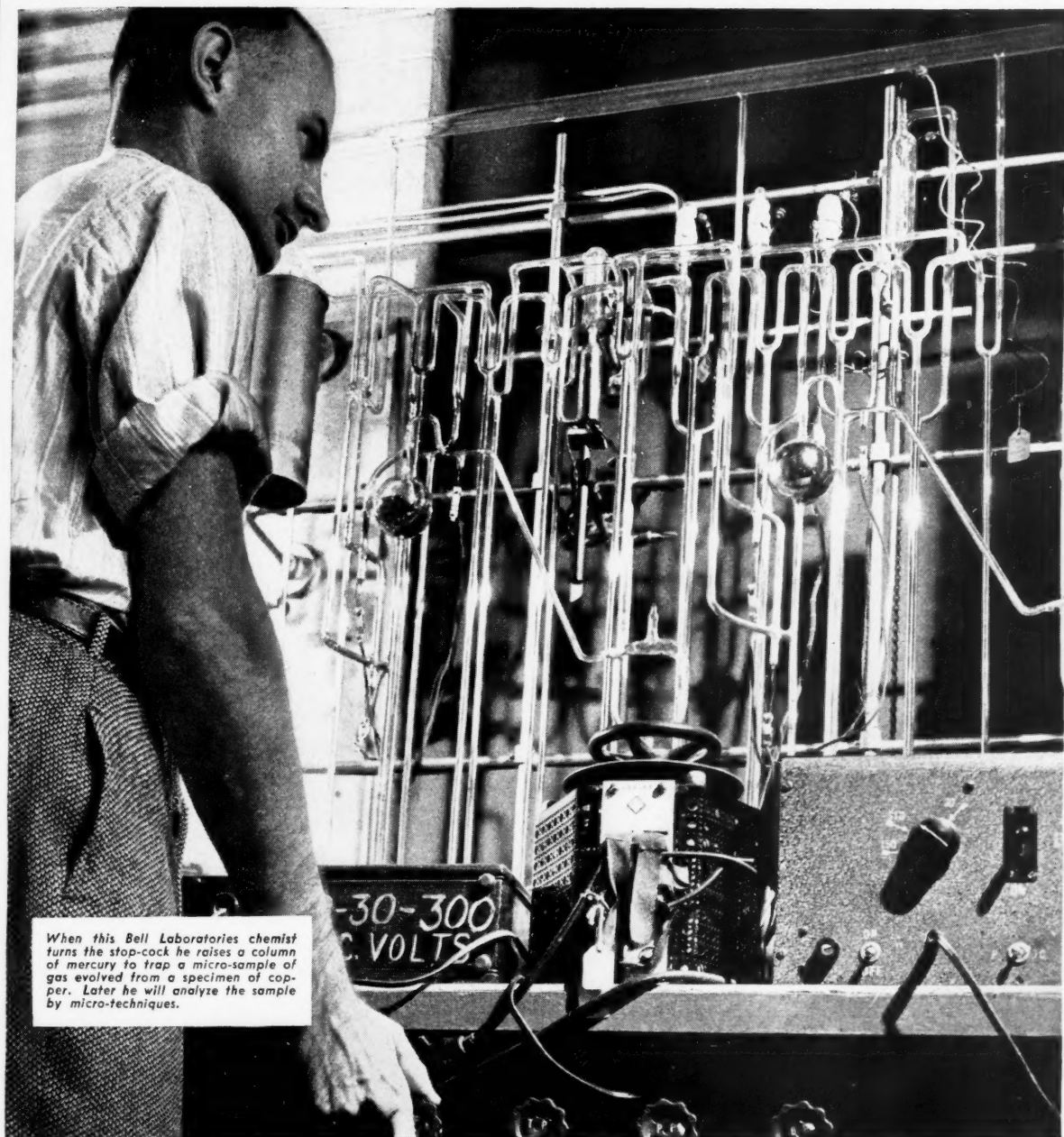
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RUBBER WORKING MACHINERY • INDIVIDUAL CURING EQUIPMENT FOR TIRES, TUBES and MECHANICAL GOODS

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When this Bell Laboratories chemist turns the stop-cock he raises a column of mercury to trap a micro-sample of gas evolved from a specimen of copper. Later he will analyze the sample by micro-techniques.

Trapping poisons by micro-chemistry

Touch of a finger-tip—or even the dust in apparently clean air—can carry enough contamination to ruin an electron tube. Bell System scientists found this out through micro-gas analysis using new and original techniques.

They determined what could destroy the tube cathode's power to give off electrons, and how much—to the millionth of a gram. Then, with Western Electric, they developed a manufacturing technique to keep these destroyers out of

the tubes. . . . Bell Telephone Laboratories scientists established the world's first industrial micro-chemical laboratory more than 16 years ago for the Bell System.

Today micro-chemistry is constantly at work, helping to raise still higher the standards of telephone service and performance.

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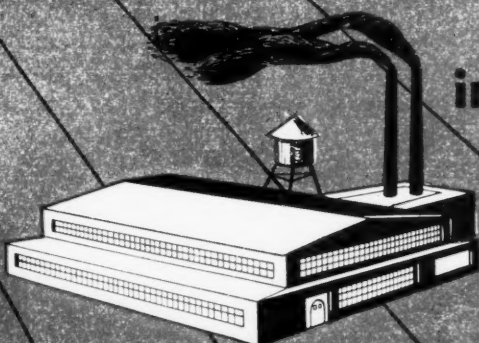


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20 Broadway, New York, N. Y.

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**Technical
Bulletin No. 28**
on the Compounding of GR-S with Substantial Loadings of Zinc Oxide

GR-S-X-272

with 100 Parts of Zinc Oxide

THE Office of Rubber Reserves describes experimental polymer X-272 as follows: "Rosin Soap GR-S made to high conversion, and stabilized with one part 'Stalite'; 95-105

Mooney; acid coagulated. This rubber has good adhesiveness imparted to it by its high Mooney viscosity and the use of rosin soap."

ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength (psi)	Per Cent Elongation	Modulus Load (psi) for Elongation of:				Permanent Set	Shore Hardness	Tear Resistance Tested at:	
			200°C.	300°C.	400°C.	500°C.			Room Temp.	100°C.
7.5	1360	720	265	450	640	830	.16	41	163	57
15	2290	615	505	775	1090	1515	.14	49	99	56
30	2020	500	620	930	1400	1865	.12	52	84	46
45	2445	530	660	930	1475	2210	.15	53	81	43
60	2350	490	705	1140	1730	—	.13	53	89	41
90	2080	470	655	1040	1655	—	.11	53	78	42

Time of Cure Min. at 45 Lb.	Goodyear-Healey Pendulum			Compression Fatigue (Goodrich Flexometer)*				Cut-Growth Resistance Tested at 70° C. Inches Failure	
	Indentation in mm.	Per Cent Rebound	Shore Hardness	Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression	5,500 Cyc.	
							Initial	Final	
60	7.73	63.8	51	24.6	15'-3.0	21.8	12.8	14.4	.94

* Test Conditions: 143 lb. Load. 0.175" Stroke. 100° C. Oven Temp.

X-272, in comparison with regular GR-S, shows definitely higher reinforcement with 100 part loadings of Zinc Oxide as measured by stress-strain results. The modulus at 300% elongation is particularly outstanding. The permanent set is comparatively low. Pendulum rebound is on the high side and the heat generation, as measured by the Goodrich Flexometer, is correspondingly low. Cut-growth resistance is lower than ordinarily obtained with GR-S, but the measurements were made on a probable over-cure. Evidence is accumulating that better results with Zinc Oxide are obtained with the higher Mooney viscosity polymers.


COMPOUND No. 28

GR-S-X-272	100.0
Sulfur	3.0
"El-Sixty"	2.0
DPG	0.1
Coumarone-indene Resin	3.0
E.L.C. Magnesia	5.0
ZINC OXIDE	100.0

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4

KINDS OF EXTRUSION EXPERTS...

Each type of rubber extrusion machine produced by Farrel-Birmingham is an expert in its own field . . . a mechanized specialist in its particular sphere of operation in the rubber industry.

Into these units Farrel-Birmingham engineers have developed the most efficient applications of the single basic operating principle (mastication and extrusion by screw action) and have skillfully "designed in" the special features and construction to best suit each machine for its particular processing purpose.

For extrusion equipment of proven ability, built to provide maximum efficiency and long, trouble-free service . . . "experts" that will fit into your production picture of profitable operation . . . call on Farrel-Birmingham.

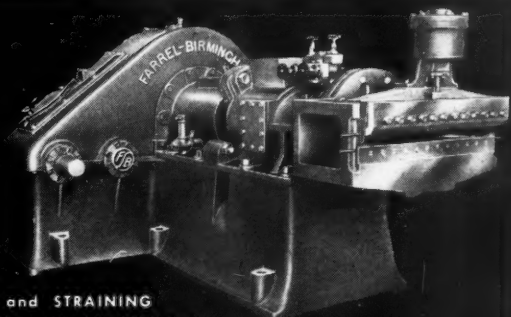
Further information about the machines illustrated or other F-B rubber processing equipment will be furnished on request.

FB-353

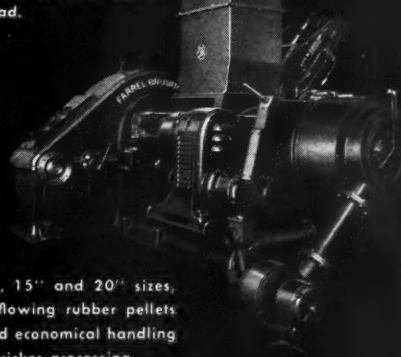
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Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.

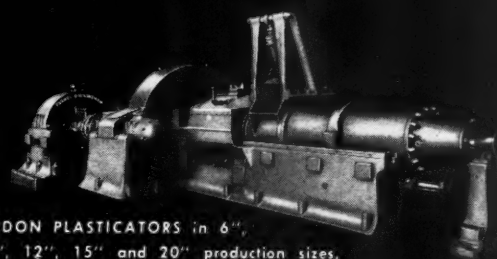
Sales Offices: Ansonia, Buffalo, Stonington, New York, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston, Charlotte.



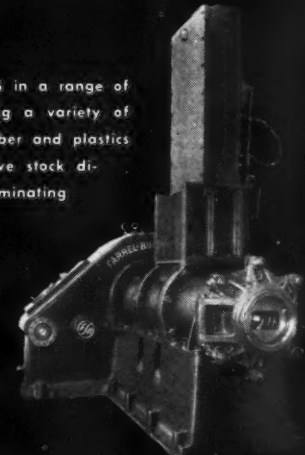
TUBING and STRAINING MACHINES in 6", 8", 8½" and 10" sizes. The exclusive roller feed increases output and produces rubber stocks of greater density and uniformity. Shape of extruded product can be varied by changing die head.



PELLETIZERS in 12", 15" and 20" sizes, for producing free flowing rubber pellets for more efficient and economical handling and storage, and quicker processing.



GORDON PLASTICATORS in 6", 8½", 12", 15" and 20" production sizes, and a 3" laboratory size, for breaking-down rubber and continuous mixing and working of plastics.

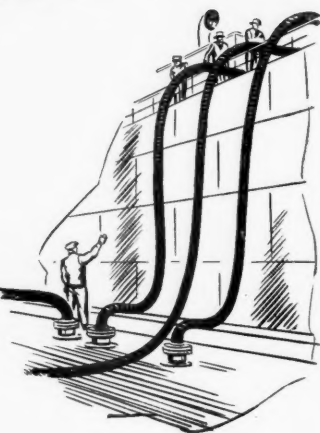
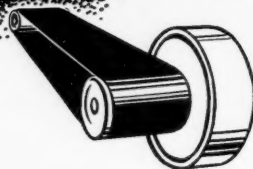


OTHER EXTRUDING MACHINES in a range of sizes from 6" to 20", having a variety of applications in processing rubber and plastics stocks. Larger machines receive stock directly from Banbury Mixers, eliminating need for sheeting mill.

Farrel-Birmingham



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Service requirements of compounds for mechanical rubber products are most exacting. The unique properties of PELLETEX help meet these needs.

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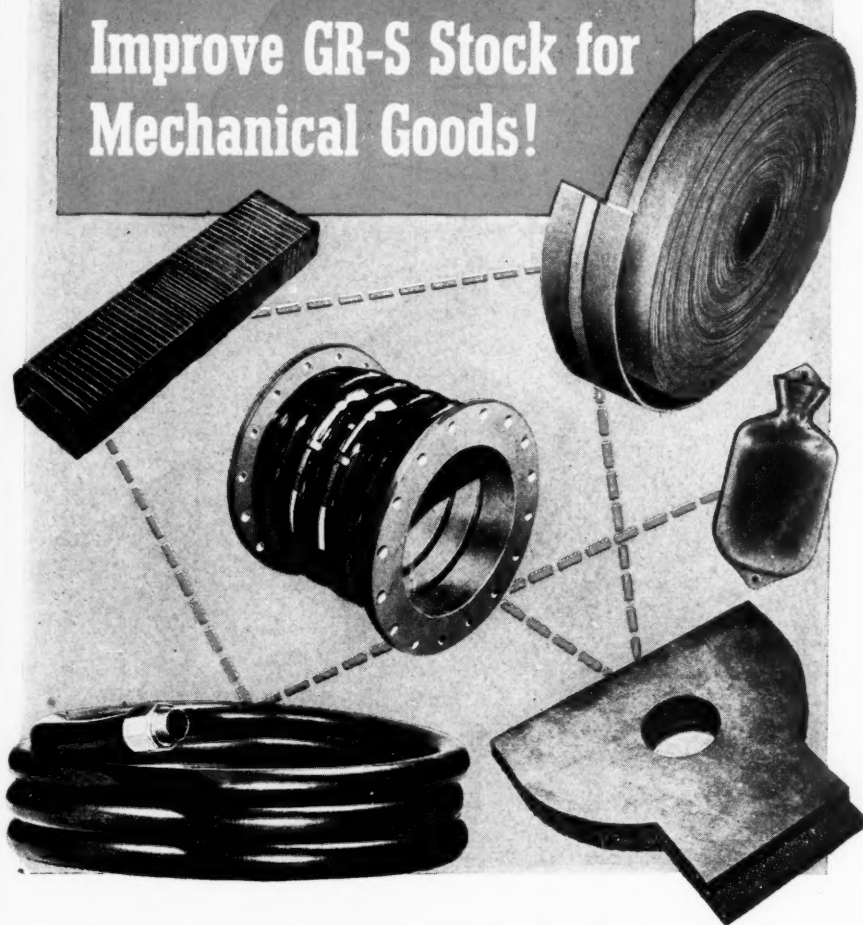
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Improve GR-S Stock for Mechanical Goods!



New S/V Sovaloid W Recommended for Wide Application

● This new plasticizer from petroleum has proved to be an ideal softener for GR-S Compounds for use in all types of mechanical goods.

Economical and plentifully available, S/V Sovaloid W gives excellent physical properties to the finished rubber. It provides smooth processing and easy calendaring and gives good dispersion of the carbon black.

Of special importance for soft stocks, you get good flex life and high ultimate elongation. Also you get maximum resistance to abrasion.

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Ask your Socony-Vacuum Representative for full details about this special plasticizer. He'll be glad to help you apply it to your individual requirements.

Better, Lower-Priced PROCESSING for all types of RUBBER

GR-S PROCESS AID S/V Sovaloid C

Assists compounding, speeds handling.

GR-S PLASTICIZERS S/V Sovaloids H & W

Extend GR-S, produce durable compounds.

LOW TEMP. FLEXIBILITY S/V Sovaloid L

Retards stiffening of Neoprene.

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No "blooming," even with large amounts.

SUN-CHECK WAX S/V Product 2243

Prevents surface cracking on natural and GR-S compounds.

GR-N PLASTICIZER S/V Sovaloid C

Fully compatible with all grades of GR-N.

SPONGE RUBBER
Special Petrolatum Emulsion
Assists manufacture of Neoprene sponge.

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FOR: Mechanical Rubber Goods • Belting

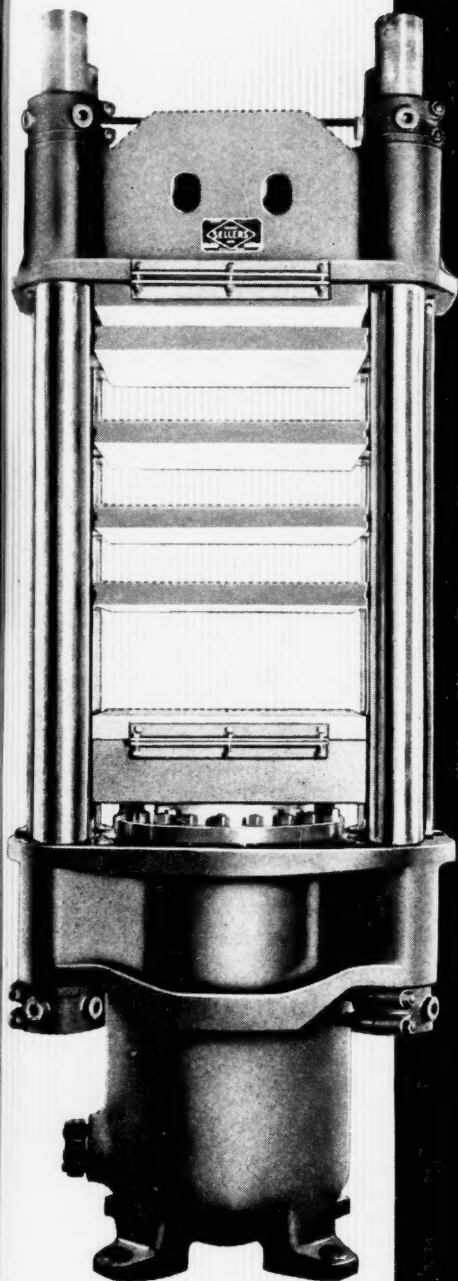
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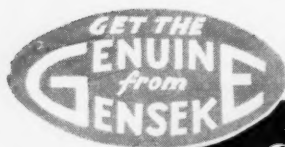
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- GLYCERIZED eliminates annoying "DUST" arising from the use of talc, soapstone, whiting or clay. A clean mill room, free from dust, is the goal of every rubber manufacturer. *Make your mill room a healthful, inviting place to work in by doing away with all 'dust'.*
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RUBBER MATERIALS DIVISION

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Since 1858

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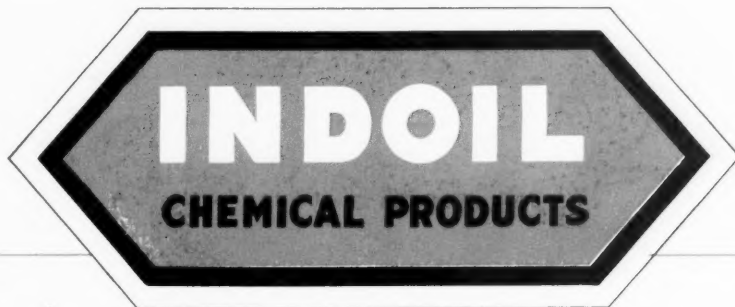
plasticizers

633½ - 634½ - 635½ - 638½ - 639½

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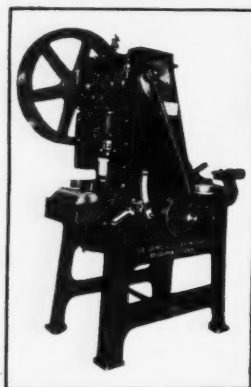


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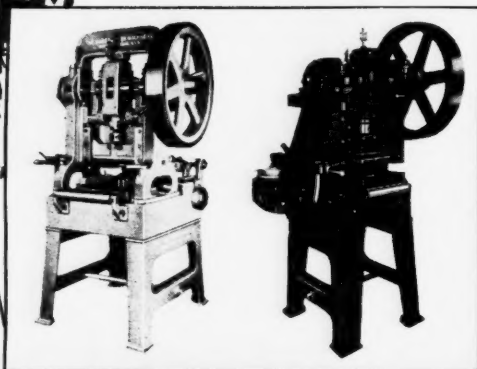


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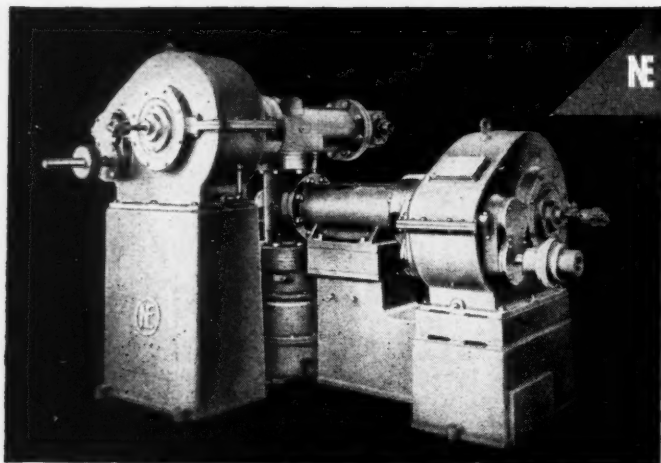
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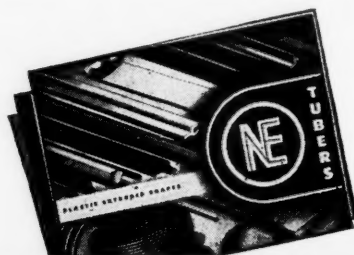
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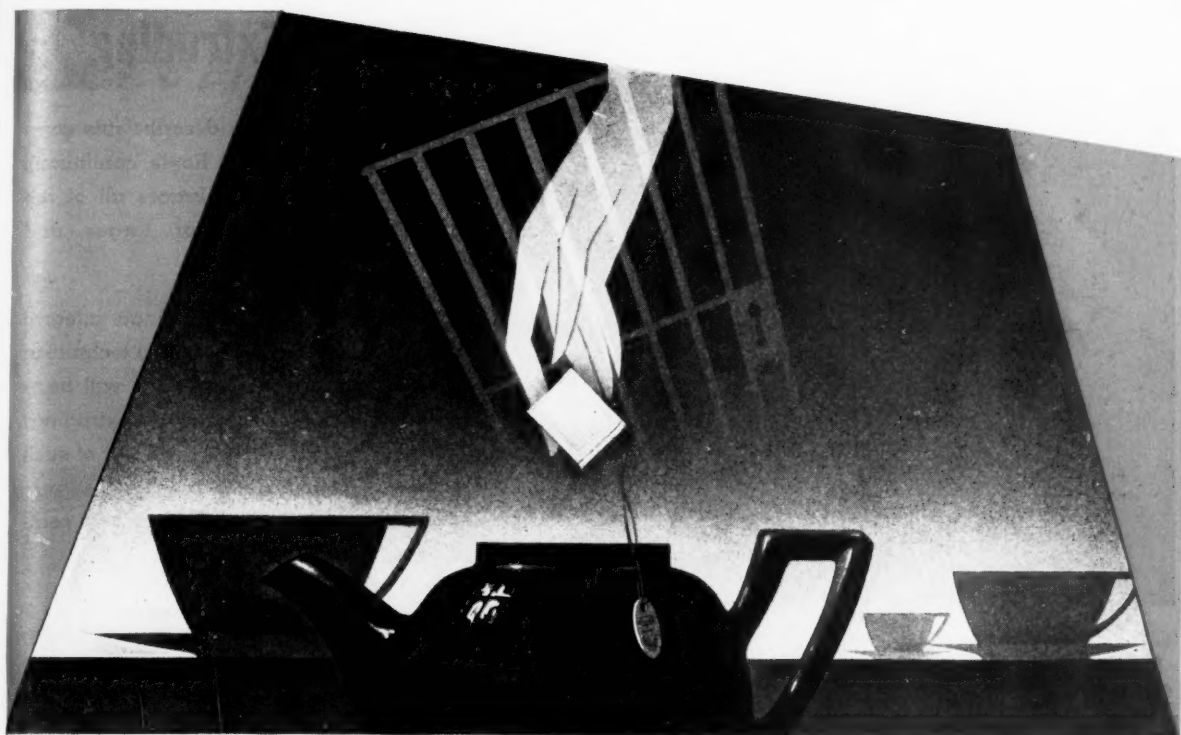
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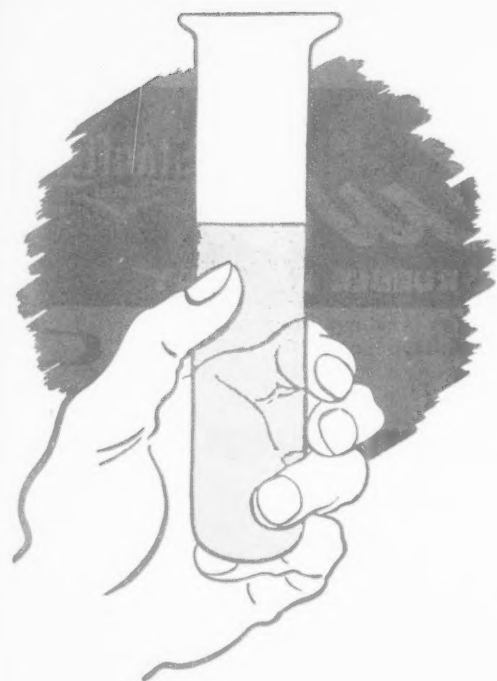
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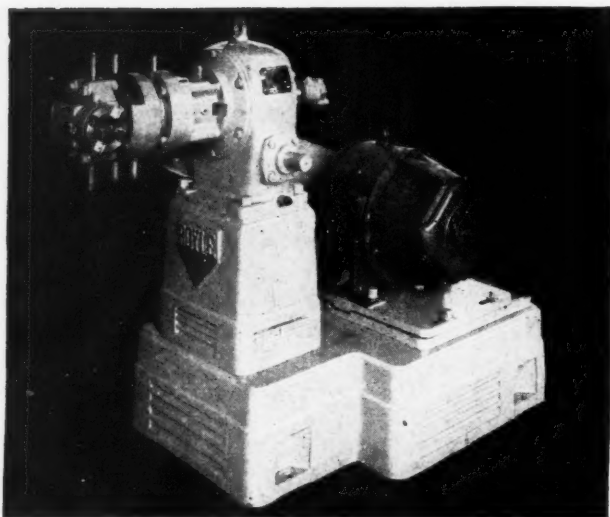
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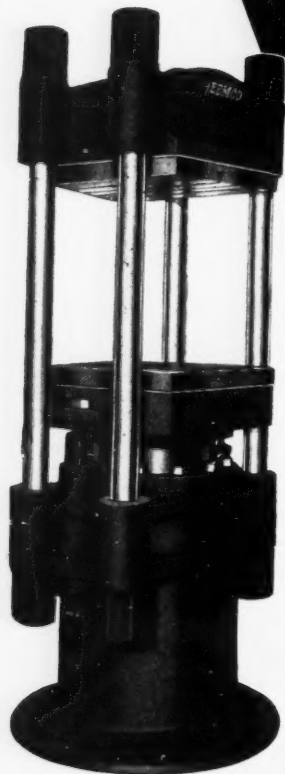
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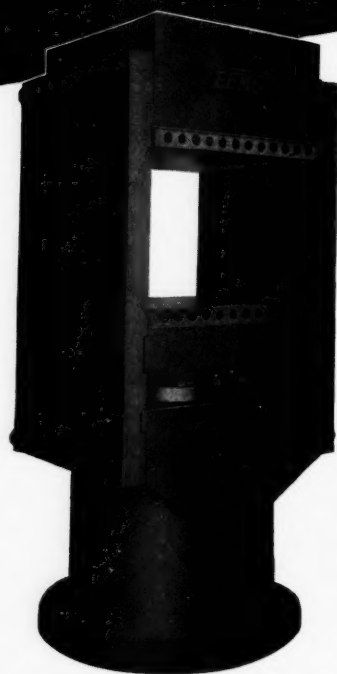
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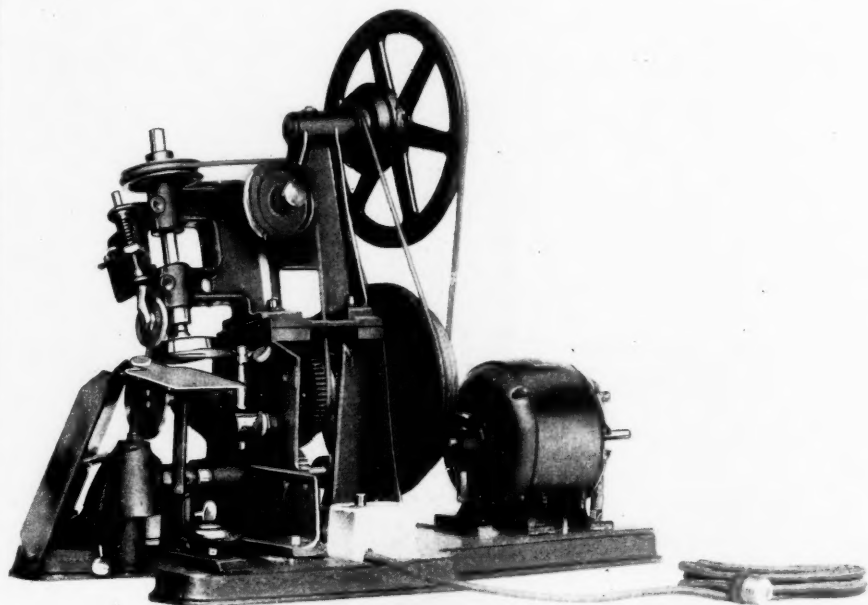
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Volume 115

Number 3

A Bill Brothers Publication

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INDIA RUBBER WORLD

NATURAL & SYNTHETIC

Volume 115

New York, December, 1946

Number 3



Prospects for the Synthetic Rubber Industry¹

R. P.
Dinsmore²

The Author

FROM its inception the synthetic rubber industry has been the subject of criticism, disagreement, conflict, and confusion. Properly to appraise its future, one should consider separately the aspects of this material as a war necessity, as an economic weapon for the American public, and as a factor in the expansion of our American chemical industry.

Background of Development

From the standpoint of war necessity it is well to recall the situation in 1939 and 1940. There was division of opinion as to whether or not it was necessary or desirable to develop a general-purpose synthetic industry. If one were to be developed, it was debated whether it should be as a standard item or on a competitive company basis. It was not known what government department might sponsor it or how. There was widespread suspicion of the motives of industry. Farsseeing patriotic business leaders were suspected of trying to promote a government experiment from selfish motives.

Then, when Japan attacked Pearl Harbor, there was a mad scramble to get going. No use then to point to the wasted months, when preparations might have been made in an orderly fashion. Business leaders understood the need of haste. They pushed on to a successful conclusion, regardless of the risks and the sacrifices they were obliged to make.

But the early days not only threw an added burden on supporting industries; they also pyramided a building program already overburdened to an almost inconceivable degree. Executive attention was diverted from military effort—not only in private industry, but in government and military circles.

As you know, rubber-tired transportation was reduced to a minimum. Our American civilization accustomed to the speed and mobility afforded by automobile and truck transportation had to slow its pace and resort to the utmost economies. Only by outstanding cooperation in community use of automobiles was it possible to avert serious delays in essential war industries. The year 1942 was our low point; 1943 howed a turn upward, and by 1944 we were well on our way out of the rubber shortage.

Importance of the American Synthetic Rubber Industry

I have recalled these events to you because, incredible as it may seem, we appear to be in danger of forgetting the lessons we have so recently learned. Regrettable as were the delays and mistakes connected with the beginnings of the rubber program in the recent war, they were not fatal. Another time we may not be so fortunate. Who can doubt that, if another war comes, it will move far more swiftly than the last, or that we are the nation most likely to be first attacked. The very life of our nation may depend upon the mobility of its population. Hence it seems to me that any threat to the continued existence and virility of the synthetic rubber industry is a threat to the safety of the United States.

There is another way in which the synthetic rubber industry is important to the welfare of the American people. It has to do with their economic protection. Again, we may seek guidance from the events of the past.

An examination of crude rubber prices on the New York market shows a remarkable fluctuation. The Brit-

¹ Presented before the Charleston Section, American Institute of Chemical Engineers, Charleston, W. Va., Nov. 21, 1946.

² Vice president in charge of research and development, Goodyear Tire & Rubber Co., Akron, O.

ish decided that they could avoid some of the excessive dips in the market by restricting the output of the rubber plantations, which were largely controlled by them in the early 1920's. Therefore the so-called Stevenson Restriction Plan was adopted in late 1922, with the resulting effect on prices. When it was abandoned in 1928, prices fell. After the early years of the depression which started in 1929, the British and the Dutch in June, 1934, collaborated on another restriction scheme called International Rubber Regulation. Because of circumstances, this was really nullified by the Japanese war, but nominally it stayed in effect until June, 1944.

These two examples show clearly that we cannot expect competitive bidding for our crude rubber business; instead we must expect collaboration to raise prices. However the attitude of our largest supplier was recently demonstrated earlier this year when we were obliged to curtail our grain alcohol and hence our synthetic rubber production in order to supply grain to the starving people of Europe. Under these conditions England, on July 1, raised the price of crude rubber sold to the U. S. Government, by 3¼¢ per pound. This act, I believe, needs no elaboration of comment.

It is perfectly logical that business people should endorse and prefer private initiative and free enterprise. It is not always sensible, however, to pit private initiative against international government monopoly without being certain that conditions offer at least an even chance of success.

Definite Policy Needed Now

On January 1, 1947, the British are declaring a free rubber market in the East. Two courses are open to this country. One is to continue government purchase of rubber on the Far Eastern market. The other is to turn rubber purchasing back to private industry.

TABLE 1. NATURAL AND SYNTHETIC RUBBER CONSUMPTION—U.S.A.
1,000 Tons

Year	Natural	Synthetic	Total
1940	648.5	3	651.5
1941	775	8	783
1942	376.8	19.1	395.9
1943	317.6	171.3	488.9
1944	144.1	566.7	710.8
1945	105.4	693.6	799
1946*	26.8	750	1018
1947*	570	410	980

*Estimated.

If we look at the estimated rubber consumption for next year, we see that the total demand is for 980,000 tons, of which 570,000 tons are estimated for crude rubber. This latter figure is based on world deliveries of between 900,000 and 1,000,000 tons of crude rubber next year, of which we are expected to get a maximum of 720,000 tons. It is further expected that 150,000 tons of this may be placed in the national military stockpile.

TABLE 2. RUBBER AVAILABLE—U.S.A.
1,000 Tons

Year	Year-End Crude Stocks	Crude Imports	Synthetic Production
1940	300	800	3
1941	350	1025	12.4
1942	400	227	22.4
1943	140	58	231.7
1944	94	98	762.6
1945	119	135	820.3
1946*	250	399	741
1947*	400	720	425

*Estimated.

Thus it is evident that with our rubber demand about equal to the total world production of natural rubber, our natural rubber consumption can only be about 60 to 70% of our total. With an undeniable prejudice in the public mind in favor of natural rubber products, there

is certain to be a scramble for natural rubber in a free market with an inadequate supply. Many manufacturers will foolishly and short-sightedly strive to obtain sufficient crude rubber; so they can advertise the superiority of their products made 100% from natural rubber. Such competition will create an intolerable condition in the industry and will promote bidding for the dwindling rubber supply, while the price sky-rockets. Every cent per pound increase in the average price of rubber will cost the American public \$22,400,000 annually. Thus, while the shortage exists, the British and the Dutch will reap the benefit, and when the crude rubber surplus arrives, they will be in a strong position to attack the weakened synthetic industry, which will have been discredited in the public mind by further controversial advertising.

The rubber industry in this country is certainly not asking for prolonged regulation, but common sense dictates that two things be done by the government: (1) continue government purchase of natural rubber while the shortage continues and (2) set up a plan to assure the use of a minimum amount of synthetic—preferably in the transitional period by product specification.

The Inter-Agency Policy Committee on Rubber has made recommendations which in general appear to support private enterprise and assure minimum synthetic production capacity for national defense purposes. However there are serious defects in their program as it exists today. The general objectives have not been integrated into a practical plan coordinated as to time and capable of prompt legislative support. There is evidence of undue haste to dispose of plants to private industry before the question of national defense measures is settled. Finally, there is at least unofficial support by the committee (CPA excepted) for free competitive purchase of natural rubber, as soon as possible. This, I believe, is contrary to public policy, for reasons already stated.

As so frequently happens, the aspects of war necessity and national economics are so interrelated that they cannot be viewed separately. If economic mistakes, such as competitive private purchase of rubber, are made in the next six months, it is probable that unfavorable popular opinion will become so fixed as to make it nearly impossible to assure a minimum consumption of synthetic rubber. Prompt action by Congress on an integrated rubber program is essential, both for our future security and for the economic protection of the American people. Lacking such action, the synthetic industry is destined to go through very troublous times.

The Use of Synthetic Rubber in Tires

It may well be questioned as to where we would use a minimum quantity of perhaps 200,000 to 250,000 tons of GR-S. I feel quite certain that the greater portion of it can be absorbed in passenger tires and still assure competitive quality. This statement is based upon the assumption that the public mind is not confused by competitive advertising extolling the superior merits of natural rubber.

In the first months of the rubber shortage the industry put out a so-called "War Tire" which was made entirely from reclaimed rubber. It gave very unsatisfactory service and acquired a bad reputation as a result. If that had been reclaim's initial appearance in tires, it would probably now be extremely difficult to sell tires containing it. Yet the fact is that reclaim has been used in first-grade tires for years with good satisfaction and economy to the purchaser. Such a result can certainly be achieved with synthetic rubber, used with some na-

tural rubber, if the situation is developed on a sane basis. There have been some very wild statements published about the quality of synthetic rubber products—especially tires. Some of them, I regret to say, have emanated from over-enthusiastic publicity departments in the rubber industry itself. These exaggerated claims have undermined public confidence and have prepared the way for harsh criticisms, from unqualified observers, such as that which recently appeared in one of our national periodicals.

I am not going to argue the case for the synthetic tire. Admittedly the large, high-speed tire made from synthetic is not too good. The passenger tire, however, did an excellent job, and it is steadily improving. Perhaps you would be interested in an actual highspeed test record of tires run overloaded under summer conditions in central Texas.

TABLE 3. TESTED IN TEXAS, AUG.-OCT., 1946

Speed 70 m.p.h	Load 110%	Inflation 28 p.s.i.	Position Rotated	Type Road Pavement	Miles Average
Results					
7 tires wore to fabric without failure at.....					24,200
9 tires failed because of fabric breaks at.....					16,984
3 tires removed because of tread cracking at.....					15,153

Average mileage to smooth stage—13,300 miles

Only two tires out of the above were removed before wearing to the smooth stage.

7,308 miles tread crack
7,840 miles fabric break

TABLE 4. TESTED IN TEXAS, AUG.-OCT., 1946

Speed 70 m.p.h	Load 110%	Inflation 28 p.s.i.	Position Rotated	Type Road Pavement	Miles Average
Size 7.00-15—4 ply					
Results					
3 tires wore to fabric without failure at.....					25,306
1 tire failed because of fabric break at.....					23,202
3 tires removed because of tread cracking at.....					11,397

Average mileage to smooth stage—16,600

In my opinion these tires are not in the amateur class. They certainly indicate that it is not going to require very much natural rubber to make them completely competitive.

Summary and Conclusions

Viewed from the standpoint of our organic chemical industry, synthetic rubber is a respectable item. At an annual rate of 750,000 tons it represents a dollar volume of \$300,000,000. Even a minimum production of 200,000 tons would have a value of \$80,000,000. These are tonnages and dollar values which the organic chemical industry does not ordinarily treat lightly.

With the development of GR-S rubber have been developed the cheap, large-scale production of two highly reactive versatile organic chemicals, butadiene and styrene. These chemicals can be produced at a cost of 6-10¢ per pound as compared to costs three to four times as high before the war. It is unnecessary for me to tell you the prospects for such hydrocarbons at these prices. It is likewise obvious that much higher costs would result from the loss of the synthetic rubber market.

It is probable that modified styrenes and substituted butadienes could be manufactured in existing plants without excessive expense for plant adaptation.

As to alcohol butadiene, speaking without much first-hand information, I am far from convinced that the books are closed on the alcohol processes, unless the whole synthetic industry dies out.

We have, then, a modern industry using abundant raw materials which prepares hydrocarbons of high purity and low cost by catalytic dehydrogenation methods.

These monomers are copolymerized by emulsification, pressure reaction to form a rubber which is cheap and

of excellent quality. Given a stabilized basic industry, the organic chemicals industry will find ways of expanding profitably around that nucleus.

We are now at the cross-roads in the rubber program. We can, by a little timely effort, consolidate our wartime gains and gain for this country security against future war shortages and against foreign economic invasion. A few months of apathy and delay may mean that we have sacrificed nearly all of our present advantages. I sincerely commend this consideration to every thoughtful citizen of this country.

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	September, 1946		September, 1945	
	Quantity	Value	Quantity	Value
UNMANUFACTURED				
Crude rubber.....lbs.	695,579	\$ 152,058	502,022	\$ 232,530
Latex.....lbs.	64,609	17,990	1,000	355
Rubber, powdered, and waste.....lbs.	1,164,500	28,435	260,700	9,902
Recovered.....lbs.	1,016,600	97,467	1,995,900	140,042
Synthetic and substitute.....lbs.	154,300	39,199	372,800	82,274
TOTALS	3,095,589	\$ 335,149	3,132,422	\$ 465,103
PARTLY MANUFACTURED				
Hard rubber in rods or tubes.....lbs.	4,628	\$ 3,241	4,846	\$ 3,389
Rubber thread, not covered.....lbs.	5,200	9,055	2,470	3,137
TOTALS	9,828	12,296	7,316	6,526
MANUFACTURED				
Belting.....		\$ 32,405		\$ 23,629
Boots and shoes of rubber, n.o.p.....prs.	8,363	7,462	3,015	1,772
Canvas shoes with rubber soles.....prs.	683	1,382		
Cement.....		37,486		23,301
Clothing of waterproofed cotton or rubber.....		1,298		582
Druggists' sundries.....		46,451		27,542
Gaskets and washers.....		19,062		14,051
Gloves.....doz. prs.	732	3,369	426	1,578
Golf balls.....doz.	712	4,168		78
Heels.....prs.	4,504	422	1,000	40
Hose.....		35,617		28,983
Hot water bottles.....		1,884		1,031
Inner tubes, n.o.p.....no.	10,536	47,197	67	416
Bicycle.....no.	2,100	1,119	443	338
Liquid sealing compound.....		10,772		249
Mats and Matting.....		48,209		1,048
Nursing nipples.....gross	1,095	3,312	519	2,948
Packing.....		10,035		6,653
Raincoats.....no.	1,940	5,823		17
Tire repair material.....		60,920		4,044
Tires, pneumatic, n.o.p.....no.	16,001	607,560	132	6,216
Bicycle.....no.	2,534	2,801	503	951
Solid for automobiles and motor trucks.....no.	67	2,370	6	249
Other.....		6,970		1,046
Other rubber manufactures.....		236,253		135,721
TOTALS		\$1,234,077		\$ 282,329
TOTAL RUBBER IMPORTS		\$1,581,522		\$ 753,958

Exports of Crude and Manufactured Rubber

UNMANUFACTURED				
Crude rubber, including synthetic rubber.....lbs.	4,895,659	\$ 910,214	2,416,162	\$ 893,163
Waste rubber.....lbs.	1,339,400	25,674	2,423,600	33,830
TOTALS	6,235,059	\$ 935,888	4,839,762	\$ 926,993
PARTLY MANUFACTURED				
Soling slabs of rubber.....lbs.	13,390	\$ 3,201	23,658	\$ 4,414
MANUFACTURED				
Bathing caps.....				180
Beltting, n.o.p.....lbs.	23,624	12,512	173,004	98,469
Belts, fan.....		198		
Boots and shoes of rubber, n.o.p.....prs.	109,899	156,405	178,831	325,497
Canvas shoes with rubber soles.....prs.	168,682	151,527	94,676	87,477
Clothing of rubber and waterproofed clothing.....		14,840		13,133
Heels.....prs.	63,054	5,463	185,428	27,854
Hose.....		2,258		39,982
Inner tubes for motor vehicles.....no.	231	485	11,553	45,095
Soles.....prs.	9,835	1,679	12,338	3,170
Tires, pneumatic for motor vehicles.....no.	651	25,076	10,723	274,225
Other.....no.	224	332	819	18,547
Wire and cable, copper, insulated.....		50,654		291,370
Other rubber manufactures.....		29,069		71,148
TOTALS		\$ 450,498		\$1,296,147
TOTAL RUBBER EXPORTS		\$1,389,587		\$2,227,554

Proper Preservation and Storage of Latex

John McGavack¹

DURING the war years, when maintaining a stockpile of natural rubber latex was of critical importance, great opportunities were offered thoroughly to establish new and improved techniques for its preservation and storage.

In the March, 1946, issue of *INDIA RUBBER WORLD* I published a summary of the methods developed at the General Laboratories of United States Rubber Co. Requests for further information were so widespread that I felt a more detailed article, giving the details of these methods, would be appropriate.

There are eight precautions which are essential if latex is to be kept in good condition during long-term storage: (1) It should be kept free from bacteria. (2) It should have a sufficiently high pH level, depending upon the type of latex. (3) It should be maintained at uniform total solids. (4) Temperature should be uniform and properly regulated. (5) It should have minimum exposure to oxygen. (6) Storage vessels should have smooth side walls and should be properly sterilized. (7) It should not be exposed to either indirect or direct light. (8) It should have a low KOH number.²

Every one of these items must be considered carefully if the latex is to be maintained at highest quality. Each one will be discussed separately.

Details of Preservation Procedures

Generally latex, when it arrives in this country, is free from bacteria, provided it originally has been preserved properly. However there are many opportunities for the entrance of bacteria into latex, as, for example, in the ships or at the unloading stations. For this reason it is absolutely essential that there be no bacteria present. This means that latex which is to be stored for long periods of time should be tested for freedom from bacteria.

Freedom from Bacteria

In order to test latex for bacteria special technique is required. As the bacteria commonly found in ammonia-preserved latex have to be cultured in media on which they thrive, it is not within the province of this paper to give the definite technique necessary to do this. We would like to state, however, that either an aerobic or anaerobic culture can be made. Fairly accurate results from either method are obtained. It requires about four days for the aerobic method and approximately three weeks for the anaerobic method.

It can be readily seen that if bacteria are present in latex to be stored, they would soon multiply and cause great deterioration or damage to the latex.

If bacteria are found to be present, it is necessary to kill them off. The proper way to destroy them depends entirely upon other conditions of storage as well as upon the actual amount of infection present. If the infection is not large and it is found that the pH level is low owing to, say, insufficient ammonia, then in most cases the simple addition of ammonia may be the only material needed to be added.

If, however, the infection is great and the ammonia level seems O.K., then it is necessary to kill off the

infection by more strenuous means. Some materials, then, that can be used are sodium pentachlorophenol, trichloronitromethane, and other similar chemicals. These chemicals must be used in very small concentrations, especially the first one as it is harmful to skin tissue. Chloropicrin is very effective in dilute concentrations, and as it breaks down after long standing, it is not harmful to the workers when processing the latex thus preserved.

Sufficient Ammonia to Preserve pH Level

Generally speaking, all commercial latices utilize ammonia, at least in part, in order to preserve them. Some commercial latices have a treatment prior to the addition of ammonia and for this reason do not require so much ammonia as those latices that have no such treatment.

All latices for storage, whether concentrates or normal latex, should be maintained at a level above pH 10.2, preferably around 10.3. The concentration of ammonia to maintain such pH levels depends upon the original preservation of the latex as well as upon the condition of the preservation at the time the level is readjusted. However, if the same degree of preservation is obtained in the samples examined, then the following amounts of ammonia will be sufficient to maintain the pH level indicated. We give below a table indicating the proper amount of ammonia.

Type of Latex	% Ammonia
Normal latex preserved entirely with ammonia.....	1.2
Normal latex, 958 type ³	1.0
Centrifuged latex preserved with ammonia.....	.65
Centrifuged 957 type ³.....	.58
Creamed latex .....	.65

It is necessary to examine latex in storage from time to time to see that these concentrations of ammonia or the proper pH levels are maintained. If examination is made and the latex was originally free from bacteria, there should be no worry from infection from outside sources.

Maintenance of Uniform Total Solids

Maintaining uniform total solids is a very important precaution. Latex, whether it is concentrated or the normal variety, creams on standing; that is, the large globules and particles readily rise to the top. This action causes a concentrated layer of rubber or butter with a low amount of serum in the upper part of the storage space. A very considerable amount of creaming will have occurred in periods of one month, and worse conditions will be obtained if the latex is not disturbed for longer times. As a matter of fact, a normal latex can be creamed by standing two years in as about an efficient manner it can be centrifuged in a few hours.

It can be seen that if this non-uniformity of solids is allowed, then the actual concentration of the preservative varies from top to bottom, and in the thick butter layer at the top the pH level will drop and proper preservation conditions are not obtained. To prevent this state of affairs, the latex should be agitated. One of the best ways to do this work is to agitate from the bottom, using a slow-speed chromium plated metal propeller turning at the rate of about 1100 r.p.m. and agitating the latex for about 10 or 15 minutes. One propeller can properly agitate a 10,000-gallon storage space without difficulty. When the storage space reaches 20,000

¹ General Laboratories, United States Rubber Co., Passaic, N. J.

² H. F. Jordan, pp. 111-25, "Proceedings of the Rubber Technology Conference, 1938," W. Heffer & Sons, Ltd., Cambridge, England (1938).

³ U. S. Rubber code numbers

or 30,000 gallons' capacity, then it is advisable to use two such propellers placed at opposite corners of the storage tank. Such a procedure, if carried out every month or six weeks, should maintain the total solid distribution in pretty fair condition. It is easy to check the total solid distribution by taking samples from the bottom, the middle portion, and the top of the storage tank and by examining what the differences might be.

If metal propellers are not available, considerable help can be obtained by agitating the latex in the storage tank by means of compressed air. Introduce the compressed air at the bottom of the tank; and if the tank is large, allow the air to blow through 10 to 15 minutes every four or five weeks. It must be understood that this method is vulnerable from the viewpoint of minimum exposure to oxygen. But it is better to maintain uniform solids and forego what difficulties might occur from the introduction of oxygen.

Other methods of maintaining proper total solids content sometimes can be applied where spacing conditions are available. This can be done by transferring the latex stored in one tank into another tank, using air pressure or vacuum, and reversing the procedure one or two times until thorough mixture is accomplished.

Regulation of Temperature

Latex should be stored at as cool a temperature as is possible provided it is above the freezing point of water. These conditions are best met by having the storage tank located in the ground. This offers more or less constant temperature conditions as the whole of the tank is subjected to approximately the same temperature. Where metal tanks, placed above the ground, are used, there are tendencies for the top of the tank to become warmer than the bottom of the tank or *vice versa*, and in such cases constant sweating occurs, which is undesirable. Metal tanks or any kind of tanks above the ground should always be protected from direct sun rays. If not, considerable coagulation and spoilage of latex directly on the metal wall will take place.

This point also applies in transportation of the latex. An insulated tank car is the best type of car in which to ship latex, either in hot or cold weather. Latex stored in metal non-insulated cars is not fit to maintain latex for any length of time.

Minimum Exposure to Air or Oxygen

There is very little to say on this point. What is desired is to protect the latex from being oxidized. Anything that can be done to keep oxygen away will be helpful. The lower the temperature at which the latex is stored will also be helpful. The application of ammonia vents in storage tanks generally insures an ammonia gas layer above the latex and prevents continual seepage of fresh outside air. This arrangement can be made by putting an ammonia trap at one of the vents.

Proper Storage Vessels

Under "Regulation of Temperature" we stated that the best place for storing latex is in the ground. It is our experience that the type of vessel best suited for storing latex is a concrete tank. This tank can be practically any size desired, 20,000 or 40,000 gallons. It must be so equipped with proper pumps that latex can be pumped in or out of the tank. The concrete must be of good variety, having a smooth surface and properly coated.

The best method to coat the concrete tank is first to get the concrete dry. Sometimes it has been found necessary to put an electric oven into the tank and heat

the tank until it is relatively dry. If this is done and if the concrete walls are fairly smooth the next step is to coat the walls with molten paraffin, which can be either sprayed or brushed on. Both methods have been used successfully. The coating should be put on as thin as possible; always be sure that the surface is completely coated.

There have been other combinations which have been used, as, for example, mixtures of paraffin and asphalt, mixtures of paraffin and chlorinated rubber, and chlorinated rubber itself, but for concrete storage tanks which are in the ground and not exposed to high temperature the molten paraffin is about as good a coating as can be obtained.

Such a coating prevents the latex from adhering to the sides of the concrete tank. It makes ready cleaning of the tank upon removal of the latex, and the hot paraffin application on the side walls also goes a long way toward sterilizing the tank before the latex is introduced.

After the paraffin coating has set, and before any latex is introduced into the storage tank, the tank should be completely fumigated by means of formaldehyde. This fumigation can be accomplished by burning p-formaldehyde candle in the tank. The customary dosage is 100 grams of p-formaldehyde per 10,000 gallons of space. While burning the candle, allow the tank to be closed for 24 hours before use.

Exposure to Light

Of course there is not much point to this precaution as concrete and steel tanks are not exposed to light, but glass bottles, demijohns, and the like should be put into dark storage for the best results.

Low KOH Number

When deterioration of latex occurs, there is a formation of acid. This can be detected by making a KOH number determination. Here again is another tool which can be used to find out whether latex is bad or is going bad.

How Long Can Latex Be Stored?

The answer to this question depends a good bit upon how the latex has been stored. We have had latices that have held up in good shape after ten years of storage. However at the end of ten years there is some deterioration mostly concerned with the non-rubber constituents, but in part concerned with the hydrocarbon itself. It is our experience that with proper storage conditions the latex can be maintained in good condition readily for three years and in a very fair condition readily for five years, and that it is quite possible to maintain latex for ten years and still be able to use it. We do not advise, however, this long period of storage unless absolutely necessary.

The biggest difficulty with storing latex is the breakdown of the non-rubber constituents. This causes formation of acidic materials in the latex. Hence the KOH number will rise over long periods of storage independent of whether the preservation conditions are correct or incorrect. Of course the KOH number will rise faster if the conditions of storage are incorrect, but, nevertheless, even though perfect conditions are met, there will be a KOH number rise with time. This rise will be at a minimum where the latex is stored at the lowest temperature or where there is a minimum amount of oxygen.

Sometimes the KOH number has risen to such a point that it makes it difficult to handle and compound

(Continued on page 373)

Research Leading to Commercial Butadiene Synthetic Rubber¹

Waldo L. Semon²

AT THE time Charles Goodyear discovered vulcanization it is safe to say that neither he nor anyone else understood the molecular structure of rubber or the chemical reaction that is responsible for the profound change in physical properties that occurs during vulcanization. It was only toward the end of the first century after his discovery that new tools and new methods of investigation made it possible for scientists to solve these challenging problems.

Now we know that natural rubber is only one member of a wide class of materials that have the property of elasticity, characterized by the ability, after being stretched 200 to 1,000%, of being able to return forcibly and rapidly to substantially their original dimensions. Thus rubber is a generic term and should be considered as one of the typical states of matter in the same class with crystals, fibers, glasses, and resins. Any material composed of a tangle of long linear molecules subject to lateral molecular motion similar to that in a liquid may be termed a "rubber." The plasticity and cold flow characteristics are determined largely by the physical and chemical forces exerted in the molecules. If the linear molecules in the tangle are not restricted by crystalline forces, hydrogen bonding, or cross-linking, the product is a thermoplastic material that can be worked on mills and molded into various shapes. Many rubber-like materials are permanently thermoplastic and not capable of being cross-linked. Thus these materials are not capable of being vulcanized. Typical of these is high molecular weight polyisobutylene.

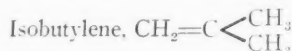
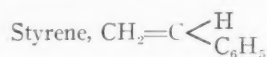
For greatest commercial value, a rubber should be capable of vulcanization—that is, after it has been formed into the desired shape, it should be possible to cause some chemical change to occur so that the linear molecules are no longer free, but are cross-bonded or netted together to restrict plastic flow. In the case of natural rubber the common way of obtaining this result is to react the rubber with sulfur. Actually the amount of chemical reaction that needs to occur to change a rubber from a thermoplastic moldable material to a product that will retain its shape is relatively small, as is evidenced by the fact that 0.5% of combined sulfur will cause such a change.

To aid in visualizing these phenomena let us compare a single molecule of natural rubber to a rope one inch in diameter and 300 to 1,000 feet long, with knots tied every four inches. A piece of rubber might be compared to a tangle made up of these long molecules similar to the tangle of fibers that is typical of a boll of cotton. If this cotton is pulled out between the fingers, the individual fibers tend to become more or less parallel; and if the pulling is continued far enough, the fibers straighten out in a perfectly parallel manner, as in the carding of cotton. A similar effect occurs with rubber. As the sample is elongated, there is an orienting of the molecules. After sufficient elongation, flow occurs, and the sample pulls apart. However, if the stress is removed before flow occurs, the lateral molecular motion tends to cause the rubber to return to its original form.

Now, if we dip a boll of cotton into dilute glue and allow it to dry, the fibers where they cross are stuck together or restricted in their action. When the sample is now pulled between the fingers, the fibers, as before, tend to assume parallel positions. However the slip or pulling apart no longer occurs unless the bonds or the fiber is broken. This structure is characteristic of vulcanized rubber.

From this introduction it should be apparent that it is not necessary to duplicate the precise chemical structure of natural rubber in order to have a synthetic rubber-like material. It is merely necessary to build up long molecular chains which retain lateral molecular freedom. Theoretically this can be done in a large number of ways. Two types of simple organic molecules that can be caused to join together by polymerization are vinyl compounds ($\text{CH}_2=\text{C}<$) and conjugated dienes.

Among typical vinyl compounds may be included:



There are literally hundreds of organic compounds that fall into this class. Not all of them, however, give rise to rubber-like materials when they polymerize. Vinyl chloride, for example, does polymerize to give long linear molecules; however, polar forces or hydrogen bonding limits the lateral motion so that the product is a solid. Styrene likewise will polymerize to long linear molecules which, however, are so restricted by steric and mass effects that the product is a resin at ordinary temperatures. Only at a higher temperature is there sufficient molecular motion to give rise to rubbery properties. Isobutylene, on the other hand, polymerizes to a highly rubbery material in which the long molecules orient and crystallize in a beautiful manner when stretched.

While there are likewise a large number of dienes, only a few will be mentioned.

Isoprene, $\text{CH}_2=\text{C} \begin{array}{l} \text{CH}_3 \\ \text{H} \end{array} - \text{C}=\text{CH}_2$, is the basic unit in the natural rubber structure.

Dimethyl butadiene, $\text{CH}_2=\text{C} \begin{array}{l} \text{CH}_3\text{CH}_3 \\ \text{CH}_3\text{CH}_3 \end{array} - \text{C}=\text{CH}_2$, was used as the basis of German methyl rubber in World War I, since it is somewhat easier than isoprene to manufacture and handle.

Chloroprene, $\text{CH}_2=\text{C} \begin{array}{l} \text{Cl} \\ \text{H} \end{array} - \text{C}=\text{CH}_2$, is the material that is polymerized to form the synthetic rubber, neoprene.

¹ Charles Goodyear Lecture delivered Apr. 11, 1946, before the Division of Rubber Chemistry, American Chemical Society, Atlantic City, N. J. Reprinted from *Chem. Eng. News*, 24, 20, 2900-905 (1946).

² B. F. Goodrich Co., Akron, O.



Elwood M. Payne, Houston

Fig. 1. A Government GR-S Plant at Port Neches, Tex., One Half of Which Is Operated by The B. F. Goodrich Co., and One Half by the Firestone Tire & Rubber Co.



Butadiene, $\text{CH}_2 = \text{C} - \text{C} = \text{CH}_2$, is the simplest member of the series. Even though it has the disadvantage of being a gas at ordinary temperature and pressure, it has been chosen as the basis for a large number of commercial synthetic rubbers. The reason for this choice will be discussed later.

It should be noted that these conjugated dienes can polymerize 1,2- or 1,4- or in any mixture of the two. However for each diene molecule that enters into the structure there is one double-bond remaining unless netting or cyclization has occurred. This double-bond is reactive and makes possible vulcanization of such polymers by rather convenient reactions. If the polymer is made solely from diene, there is a tremendous amount of unsaturation in the molecule, more than is actually required to give satisfactory vulcanization. Hence the idea developed that advantages can be obtained by copolymerizing vinyl compounds and dienes into the same molecule. The nitrile rubbers, GR-S, and Butyl rubbers are all typical of such copolymers, in which the diene portion of the molecule contributes vulcanizing properties and the vinyl portion of the molecule contributes to the elastic and plastic properties.

Commercial Production of Synthetic Rubber

The problem of devising a commercial synthetic rubber resolves itself into making a large number of polymers and copolymers of vinyl compounds and dienes under varying conditions and evaluating the polymers as rubbers. This polymerization can be carried out either undiluted in mass, in solvent solution, or in emulsion. All methods were tried in the laboratory. However it soon developed that the control possible, when using emulsion polymerization, warranted that the major portion of the effort to be put on this process.

Some idea of the tremendous amount of work required in the research on and selection of synthetic rubbers may be gathered from the fact that prior to Pearl Harbor there were prepared and evaluated in our laboratory 14,492 different synthetic rubbers. Of these less than 100 were considered worthy of pilot-plant trial for commercial development. The total number that has been produced and used on a commercial scale is only about a dozen. The results of this extensive work were incorporated in patent applications, most of which, because of wartime restrictions, were placed under

secrecy orders. Now that the emergency is over, a number of patents have been issued covering this laboratory and pilot-plant work. Of these 79 appeared in 1945.

In discussing in detail a process used for making synthetic rubber, let me quote from a United States patent (1).³

"A synthetic rubber latex is prepared by polymerizing a mixture of 75 parts of butadiene-1,3 and 25 parts of styrene in an aqueous emulsion containing, in addition to the monomers, 180 parts of water, 5 parts of fatty acid soap as an emulsifying agent, 0.3-part of potassium persulfate as a polymerization initiator, and 0.6-part of a mixture . . . predominantly of dodecyl mercaptan as a polymerization modifier, for 14 hours at a temperature of 50° C. and then adding, to stop the polymerization, 0.2-part of beta-naphthol, a polymerization inhibitor, dispersed in water. In this latex approximately 78% of the monomers are converted into the synthetic rubber copolymer while the remaining 22% of the monomers are in the monomeric or unpolymerized form. The latex is then subjected to a vacuum to flash out the unpolymerized butadiene-1,3. . . ."

"A quantity of the thus obtained latex (still containing approximately 3% by volume of monomeric styrene) is then fed . . . to the top of a . . . stripping column . . . equipped for steam distillation with a . . . foam separator head, a condenser, condensate-separator, and means for introducing steam at the bottom of the column in a ratio of about 5 parts of steam for 1 part of styrene in the latex . . ."

Following this there is added a dispersion containing 1.5 parts of age resister for each 100 parts of rubber. The latex so obtained is coagulated, washed, dried, and baled.

If a specialty oil-resisting nitrile rubber is to be manufactured, the process is somewhat similar to that given above, with the exception that acrylonitrile is used in place of styrene.

This simplified description of the process of emulsion polymerization is typical of those found in most patents or published articles. This one lists the main variables to be considered in polymerization work, but does not disclose why the various components were chosen or the different processes were conducted. Research leading to the development of commercial synthetic rubber had to do largely with the systematic study of these variables and the selection of those raw materials and conditions which would produce a satisfactory synthetic rubber at a low enough cost to be usable commercially.

In laboratory investigations the polymerizations could be run batchwise in sealed tubes, according to the Fryling process (2), in bottles, or in autoclaves. In tubes the degree of conversion could be estimated by measuring the decrease in volume; in autoclaves the reaction could be followed by withdrawing and analyzing samples from time to time; and in tubes or bottles the reaction could be stopped after proceeding for any specified time and the entire contents analyzed. Much of the information given later in this paper was obtained by the tube technique and subsequently checked by bottle runs or in autoclaves.

The possibility of continuous polymerization was certainly suggested as an outgrowth of the early tube studies (3). Research on this problem, however, required special equipment and introduced new factors which will not be discussed here.

Process Analyzed

Let us now consider the function of each of the ingredients and steps as set forth in the patent.

³ Bibliography references appear at the end of the article.

BUTADIENE. Butadiene forms the main basis for the molecular chain of the butadiene synthetic rubbers. The double-bond remaining after the polymerization is responsible for the ability of the synthetic rubber to vulcanize. While the butadiene could be replaced in whole or in part by other dienes such as isoprene, dimethyl butadiene, or methyl pentadiene, it has been found that the products made with butadiene as the sole diene yield rubber having the lowest hysteresis, highest rebound, and best low-temperature characteristics.

Butadiene of high purity is required if the polymerization is to proceed rapidly to yield a uniform high-quality rubber. A number of materials, such as most paraffins and olefins, interfere with and slow up the polymerization merely by a dilution effect. There are, however, compounds which may be present as impurities that inhibit polymerization. Among these may be mentioned 1,4-pentadiene and vinyl cyclohexene. On the other hand there are impurities which do not appreciably slow up the polymerization, yet give rise to a tough or semi-vulcanized polymer. Vinyl acetylene is a typical representative of this class (4).

While it is necessary that the butadiene used in the polymerization process should polymerize rapidly and completely, nevertheless this butadiene has to be stored and handled under conditions that would normally cause considerable polymerization. This paradox can be solved by adding to the butadiene in storage an inhibitor (5) such as a mercaptan, an aromatic amine, or a phenol. To recover the butadiene in a form suitable for use it must be distilled if an aromatic amine such as phenyl- β -naphthylamine has been used. However, if a phenol such as *tert*-butyl catechol is used, it can be removed merely by washing the butadiene with dilute caustic in iron equipment.

STYRENE OR OTHER COMONOMERS. The function of the vinyl compound used as a comonomer along with the diene is to increase the tensile strength and improve the plasticity of the copolymer (6). These materials, however, may give rise to certain undesirable characteristics such as decreased rebound elasticity and poorer low-temperature characteristics.

Styrene is the comonomer used in making GR-S. It is cheap, readily purified, and gives a copolymer that is miscible with natural rubber. When acrylonitrile is used as the comonomer, there is formed a nitrile rubber characterized by high tensile strength and low swelling in oils. Such rubbers are not miscible with natural rubber or with many other copolymers, hence are usually considered specialty rubbers.

Use of acrylate, methacrylate, or allyl esters as the comonomer (6) gives highgrade rubbers. By varying the ester, products especially suited for inner tubes, for carcasses, or for tread rubbers can be obtained. Many of these rubbers are characterized by extremely good heat resistance.

If various substituted styrenes such as alkoxy styrene (7) or chloro styrenes (8) are used, there is obtained an improvement in the high-temperature and flexing characteristics of the rubber, at the sacrifice, however, of a certain amount of low-temperature flexibility.

In some cases it is desirable to use more than one comonomer in a recipe. Thus, if acrylonitrile is used with styrene or methyl methacrylate, polymerization occurs more rapidly, and the rubbers obtained may have specially desirable processing characteristics (9).

RATIO OF DIENE TO COMONOMER. The ratio of diene to comonomer has an important effect on the processing characteristics of the polymers obtained. In general, rubbers made with higher proportions of comonomers are easier to process. This ratio rather than the details

of the polymerization controls the hysteresis, low-temperature properties, and oil resistance of the synthetic rubbers.

Useful rubbers can often be obtained even when a high proportion of comonomer is used. Thus in the system butadiene-styrene, when as high as 50 to 60% of styrene is used in the recipe, the copolymer that is formed processes easily, makes good cements and can be used especially for making sealing compounds and high impact strength ebonites.

WATER. In emulsion polymerization, water is used as the dispersing medium in which to carry out the reaction. It also serves to keep the rubber in a fluid form so that the heat of reaction can be controlled by repeated passage of the reacting mixture over the cooling surface. It is usual to use 180 to 200 parts of water per 100 parts of monomer (10). Lower amounts can be used if the recipe is carefully adjusted and precautions are taken to avoid pre-coagulation or gelling.

The requirements for purity of the water are most stringent. Distilled water free from metallic contamination is satisfactory; however, it has been found that deionized or zeolite-softened water can be used in most cases with equivalent results.

EMULSIFYING AGENTS. The fatty acid soap or other emulsifying agent used in the emulsion polymerization process serves to solubilize the reactants so that the reaction starts in monomer oriented in the micelles (11). After a sufficient number of particles have been formed, such that adsorption of soap on their surface reduces the residual concentration of soap to a point where essentially no more micelles are present, further polymerization occurs on the surface of the particles already formed, and the emulsifying agent then serves to prevent aggregation or coagulation.

Two types of emulsifying agents may be considered in the polymerization reaction. One of these tends to give the micelles in which the monomer dissolves; the other tends to coat the surface of the rubber particles and of the equipment to prevent sticking.

SOLUBILIZING AGENTS. The most efficient solubilizing agents are soaps which form micelles at the temperature of the reaction. If the polymerization is to be run at a low temperature, soaps which are fairly soluble in water are required—namely, the myristates and oleates. If the reaction is to be performed at a higher temperature, then less soluble soaps such as the palmitates and stearates are preferable. A rather high concentration of soap is required if polymerization is to proceed rapidly. For commercial purposes, the optimum concentration is 2% to 3% on the water.

The soaps used in the manufacture of synthetic rubber are of higher quality than the best-grade soap flakes used for domestic laundering. Impurities in the soaps may have a profound effect in inhibiting or preventing polymerization (10), and most commercial soaps are unsatisfactory since they have builders, impurities, and natural inhibitors present. The soaps used in the synthetic rubber program are made from specially hydrogenated oils or from fatty acids that have been recrystallized to remove impurities. Soaps containing the sodium salt of linoleic acid retard polymerization, yet yield a highly plastic rubber (35). Because of this softening effect and the shortage of animal fats, soaps made from linseed oil were used by the Germans in polymerizing much of their synthetic rubber.

The free fatty acid from which the soap is prepared is not a harmful impurity, for soaps containing an excess of fatty acid in many cases give more rapid polymerization and improved quality in the synthetic rubber (10).

Based on theory and analogy, rosin soaps would seem to be highly desirable in the manufacture of synthetic rubber. However ordinary rosin contains phenolic inhibitors and also unsaturation somewhat similar to that present in linoleic acid. Soaps made from specially purified hydrogenated or dehydrogenated rosin acids give outstanding results and are used in the manufacture of GR-S-10.

PROTECTIVE AGENTS. There are many emulsifying agents which are not of value for initiating polymerization. However many of these do have real value in a polymerization recipe, since they may improve the stability of the latex and prevent build-up of polymer on the reaction vessel and pipes. Examples of these materials include sodium lauryl sulfate, sodium alkyl benzene sulfonates (12), and sodium dialkyl naphthalene sulfonates.

CATIONIC SALTS. Certain salts of organic bases (13) give micelles which can solubilize and orient monomers. Since they act in an acid medium, they are of theoretical interest for use as emulsifying agents for making synthetic rubber. Among these materials may be mentioned the hydrochloride of dodecyl amine (14) and the hydrochloride of diethylaminoethyl oleamide.

MODIFIERS. Certain surface-active agents have been found to control the growth of the polymer chain. Apparently they function by reacting with and preventing the chains from branching (15) or becoming too long. Large numbers of materials have been investigated for this use as modifiers (15, 16, 17, 18). However the higher mercaptans (19) and bis-xanthogens (20) are particularly good and are extensively used commercially for this purpose (1).

POLYMERIZATION ACCELERATORS. Polymerization accelerators may be defined as minor additives to the polymerization recipe which serve to accelerate the rate of polymerization, usually, first, by removing the inhibitors, or, second, by combining with and making more active the usual initiators of polymerization. Certain alpha amino acids and complex heavy metal salts function in this category (17, 21). Sodium ferric pyrophosphate activated with a trace of cobalt salt is typical of a complex metal activator (22).

INHIBITORS OF POLYMERIZATION. Many inhibitors of polymerization find their way into the polymerizing system. These may be gasses picked up from the atmosphere, impurities in the water, metal impurities from the pipe lines (23), or even such things as inhibiting material from the gloves of the workers. Of course this factor has to be held under close control if uniform operations are to be assured.

POLYMERIZATION INITIATORS. In carrying out a polymerization all of the major ingredients may be added and then thoroughly mixed. The reaction can then be started by more or less of a "trigger" action by adding the initiator. Polymerization initiators function by some chemical reaction which generates hot spots or sufficient energy locally to start chain formation. One reaction quite effective in this respect is oxidation of a reducing agent. Many reducing agents are present in most polymerization mixtures, either as impurities, as monomers, or ingredients added purposely such as the modifiers. It is usually unnecessary to add an additional reducing agent to care for this reaction. The oxidizing agent to be used (1) depends upon the temperature at which the polymerization is to be performed. For polymerizations to be run at a low temperature, hydrogen peroxide is found to be extremely satisfactory. It is often useful to add a peroxide stabilizer, such as sodium pyrophosphate, amino acids, or even acetanilide to function in this respect. For polymerization to be performed at higher temperatures, more

stable oxidation agents give better results. Among these may be mentioned potassium persulfate and sodium perborate. In place of peroxides, certain diazo compounds (36, 25) can be used as initiators. Their decomposition apparently furnishes enough energy to start chains.

TEMPERATURE OF REACTION. In choosing a temperature for conducting the polymerization, a compromise must be reached. In general, with any specific system, the lower the temperature at which the polymerization is performed, the higher the quality of the resultant rubber. However polymerization proceeds more slowly at lower temperatures; hence, practically, it is necessary to operate at a high enough temperature to complete the reaction in a reasonable time. Polymerization, however, will occur in the entire range between 0° and 100° C. By proper selection of the variables it is often possible to set up a system that will give as good a rubber at higher temperature as some other better known system might give at a considerably lower temperature. By utilization of this principle there is hope that simple and fast continuous polymerization systems may be worked out.

It should be noted that the higher the temperature at which the polymerization proceeds, the higher the vapor pressure of the reacting mixture and the stronger the vessel that will be required.

TIME OF REACTION. Polymerization is a typical autocatalytic reaction characterized in general by an S-shaped curve. Usually there is an induction period in which the reaction starts off slowly gathering speed until it reaches a rather constant and maximum rate which maintains until the reactants are approximately 75 to 80% consumed. Thereafter the rate slows down. By example, a reaction may go 75% to completion in 14 hours, yet requires 30 hours to reach 95%.

In general there is no direct correlation between rate of polymerization and quality of rubber made. For practical reasons, therefore, polymerization should be made as rapid as possible. However heat transfer between the latex and the cooling medium usually sets the upper limit upon the speed of the reaction.

DEGREE OF CONVERSION. The completeness with which the monomers are allowed to polymerize has a decided effect upon the processing properties of the resultant polymer. In general there is formed first in any system a rather soft and elastic polymer. A number of factors such as decrease in concentration of reactants, increase in concentration of residual impurities, and branching or crosslinking that occurs in the latter stages of the reaction when more of the modifier has been used up, lead to tougher rubber at higher degrees of conversion. It would, of course, be ideal to carry polymerization to completion so that recovery of the monomers would not be required. Practically, however, for maximum output from any given plant it has been found best to carry the reactions about 75% to completion and then recover and reuse the remaining 25% of the monomers.

RATIO IN WHICH REACTANTS COMBINE. When two or more monomeric materials copolymerize so that both enter the polymer molecules, the ratio of combination often differs from the ratio at which the materials are present in the reaction mixture. This can be shown nicely in the butadiene-acrylonitrile system (Figure 2). When butadiene and acrylonitrile are charged in a molecular ratio higher than about 2:1, the first polymer formed will have a ratio quite close to 2:1. As polymerization proceeds and acrylonitrile is consumed at a disproportionately high rate, the ratio of butadiene in the polymer increases. On the other hand if less butadiene is present than corresponds to a 1.6:1 ratio, the

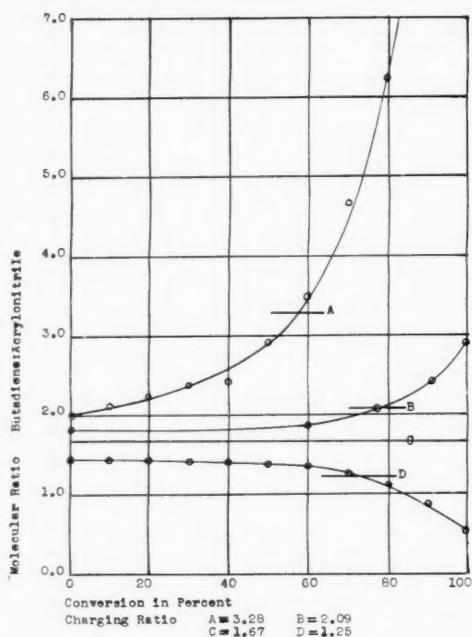


Fig. 2. Composition of Butadiene-Acrylonitrile Copolymer Formed at Any Instant as Affected by the Composition Charged and the Degree of Conversion at That Instant

polymer will have slightly less butadiene in it than corresponds to the charging ratio, and as reaction proceeds, the polymer formed will become progressively higher in acrylonitrile.

However, when butadiene and acrylonitrile are charged in a molecular ratio of about 1.67:1, it has been found that all of the mixture polymerizes in this same ratio. Thus, with respect to composition, butadiene-acrylonitrile copolymers, aside from the one exception given above, are heterogeneous in character. Somewhat similar effects have been noted in most other copolymeric systems.

FORMATION AND TREATMENT OF THE LATEX. In the manufacture of synthetic rubber latex, highly efficient agitation is not required. The main reason for agitation is to obtain gross mixing of the monomers with the aqueous phase and to bring the contents periodically in contact with the cool surface so as to remove the exothermal heat of polymerization. Fine particles probably originally containing no more than one molecule of the polymer are formed when the solubilized monomers polymerize and are rejected from the micelle in which they are formed. These particles grow probably by formation of further polymer on the surface. There appears to be little evidence of aggregation of smaller particles. At any rate at the end of the polymerization the contents of the polymerizer are in the form of a latex containing 25 to 50% polymer. Each particle is of the order of 500 to 600 Å in diameter and is thus so small that it can be seen only in the electron microscope. The surfaces of the particles are only partially covered by the emulsifying agent, and as much as 80% of the surface may remain capable of adsorbing further soap.

Since the reaction has usually not been carried to completion, there remains a considerable portion of the monomer in solution or adsorbed on the surface of the particles. It is desirable to stop further polymerization by adding a shortstop. This deactivates the polymerization initiators and inhibits further polymerization. Ma-

terials which are satisfactory for this are various organic and inorganic reducing agents (1, 26). Either hydroquinone or β -naphthol is satisfactory.

As further polymerization has been inhibited, it is now necessary to separate the excess monomers from the latex; so they may be condensed and reused, possibly after purification to remove impurities which have accumulated. The butadiene present can be separated merely by flashing the latex at reaction temperature into a large vacuum tank. The butadiene vapor which boils off can be compressed, liquefied, and recovered. Styrene or other monomers of relatively low volatility tend to remain in the latex. They can be removed by steam distilling the latex either in a large reactor or in a stripping column.

The rubber in the latex from which the monomers have been removed is still highly reactive chemically. In order to prevent isomerization, cyclizing, or oxidation when the rubber comes in contact with the air, it is necessary to incorporate in the rubber from 1% to 3% of antioxidant. This can be done conveniently by dispersing the antioxidant in water and stirring it with the latex. In time diffusion occurs through the water phase into the particles of rubber. On the other hand, if the latex and antioxidant are mixed and coagulated immediately, the diffusion of the antioxidant occurs in a satisfactory manner in the solid rubber. Numerous antioxidant have been used in the manufacture of synthetic rubber. Phenyl- β -naphthylamine or various alkyl substituted diphenylamines have been used in largest volume, although certain phenol derivatives are used for special purposes.

The latex, after being stripped and stabilized with an antioxidant, can be utilized for those purposes where synthetic rubber latex is satisfactory. In the manufacture of latex for use as such, special recipes and special techniques are often utilized (12, 27) to give a higher concentration of total solids or a product which gives a film of greater wet strength. No attempt will be made to discuss here the factors that control these special operations.

THE COAGULATION PROCESS. Most synthetic rubber is used today on equipment that was originally designed for use with natural rubber. Hence the latex must be coagulated (28), washed, and dried to be in a form that can be handled on rubber mills.

The coagulation of synthetic rubber latex is not greatly different from that of natural rubber. Most of the latex produced in this country contains 6% to 7% of soap on the rubber. The soap can be salted out of solution by adding brine, following which, treatment with dilute acid converts it to the water insoluble acid (29). The 5% to 6% of fatty acid thus remaining, when ordinary soaps are used for emulsification, can be tolerated and even utilized in the compounding of the synthetic rubber.

In place of using salt and acid, a polyvalent salt such as aluminum sulfate can be used to coagulate the rubber (30). In this case a hydrolyzed aluminum soap is usually left in the rubber.

If in place of fatty acid soaps there is used one of the modified rosin soaps, after the coagulation process there is left in the rubber a rosin acid which is much more sticky than the fatty acids. Rubber of this type (GR-S-10) has been found to be most convenient for use in making tires, since it has greater building tack and imparts superior physical properties to the finished tires.

After the latex has been coagulated and is still in the form of crumbs, fatty acid may be extracted by heating the crumbs with a dilute alkali (31). The rubber does

not redisperse. The soap, however, does diffuse into the water layer and can be washed from the rubber. Certain synthetic rubbers on the market are freed from fatty acid by this process.

Drying and Packaging

If the coagulation is performed under conditions that give rise to large crumbs, these can be filtered and washed on a continuous rotary filter. The crumbs may then pass continuously through a drier on a belt. The product leaving the drier can be compressed in the form of blocks by the use of a baling machine. Most of the GR-S produced is in this form.

On the other hand, if the latex is coagulated in the form of fine crumbs, these can be filtered off and washed on a Fourdrinier by a process similar to the formation of paper. The blanket of rubber can then be dried continuously in an oven and then folded into bales.

Numerous other mechanical processes for carrying out the drying and bulking operation are possible, but will not be discussed.

Use of Synthetic Rubber

By varying the proportion of modifier used, the degree of conversion, and other factors under control in the polymerization plant, it is possible to produce synthetic rubbers having various degrees of plasticity. The softer rubbers can be thrown directly on the mill or in the Banbury and incorporated with the compounding ingredients. The tougher rubbers which are often used to obtain better physical properties in the finished rubber articles often have to be heat-softened or plasticized before the compounding ingredients can be added. These operations are similar to the corresponding operations in the case of natural rubber. While some chemical plasticating agents are known, there is a real need of better products for use in synthetic rubber.

The compounding of the synthetic rubber is not too different from that of natural rubber. With the nitrile oil-resisting rubbers, special softeners or elasticizers are required. Various aromatic compounds (32), esters (24, 33), or nitriles (34) can be used.

The most outstanding difference between the compounding of natural rubber and butadiene copolymer synthetic rubbers is the fact that these latter show relatively low tensile strength, unless reinforced with carbon black. While natural rubber shows reinforcement by carbon black, the relative effect is nowhere near so great as with the synthetic rubbers.

The same accelerators and vulcanizing agents can be used with synthetic rubber as are used in natural rubber. In general, however, butadiene synthetic rubbers are less scorchy than natural rubber, hence can be more highly accelerated without danger of scorching. In certain of the synthetic rubbers the problem of dispersion and solubility of sulphur has caused difficulty. This has given rise to the development of methods for vulcanizing synthetic rubber that do not utilize free sulfur. These new vulcanizing agents and curing processes are expected to find wide use with synthetic rubber, and later these processes will probably be used with natural rubber when it again becomes available in volume.

Conclusion

The investigation of the various factors relating to the manufacture of butadiene synthetic rubber was carried out with a relatively small personnel. The pilot-plant study and engineering design for the large plants

required more. However the construction and operation of the large plants utilized the services of a vast number of skilled workers and technicians. The synthetic rubber industry, as we have it today, is the result of group effort. Chemists, engineers, and production men all contributed their utmost to the project.

The success of the project can be measured in several ways: the plants, as soon as completed, started turning out synthetic rubber of satisfactory quality; productive capacity of every plant exceeded the design capacity; and production costs were lower than estimated and have been continually decreasing.

During 1945 the production of butadiene synthetic rubber was greater than our highest prewar consumption of natural rubber. In these plants, for instance, in 1945 there were produced 830,000 long tons of GR-S, which is 1,850,000,000 pounds. If converted into 6.00×16 tires, this quantity of rubber would make 169,000,000 tires or $1\frac{1}{4}$ tires for every man, woman, and child in the United States. Or if extruded into a solid cylindrical band two inches in diameter, it would be long enough to reach from the moon to the earth, and enough would still be left over to encircle the earth at the equator.

Better synthetic rubber tires are being made continually. Passenger tires that outwear prewar tires are even now being made 100% from GR-S.

We may expect new types of synthetic rubber as the information which is accumulating in the laboratories is put to work. We may expect better tires and better rubber articles of all kinds. Natural and synthetic rubber will work together, each being used where it will give the best service. With proper cooperation between research and production it would appear that the cost can be kept competitive with that of natural rubber. No longer will there be such wild fluctuations in the price of natural rubber, for synthetic has set a ceiling.

Much has been accomplished by research in developing and improving synthetic rubber. Much remains to be done. Nevertheless synthetic rubber has been a wonderful development and future possibilities appear unlimited.

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The Evaluation of Guayule Rubber

THROUGH the years a large amount of information has been collected concerning the vulcanization requirements of *Hevea* rubber, and in recent years studies have been expanded to include synthetic rubbers, particularly GR-S. Comparatively few results have been made known on guayule rubbers. Mention is to be made, however, of the published work of Spence and Boone (1)³ who have shown that "when properly prepared, the rubber from guayule will compare favorably with that from *Hevea* and can be used to a large extent as a direct equivalent therefor without appreciable diminution of the tensile elongation product." Some service tests of tires and tubes in which the rubber was exclusively guayule were reported in India RUBBER WORLD (2) and by Doering (3). Hauser and le Beau (4) in a study on desinated guayule rubber (6% resin) reported that high stearic acid was beneficial. Morris and co-workers (5) investigated several accelerator-curing agent combinations in a carbon black formula with three types of guayule rubbers. No survey would be complete without mention of the very extensive work done by the Intercontinental Rubber Co. around 1926. The unpublished records of this work are now the property of the United States Government. Although their results have not been included in the present study, several were confirmed.

Hevea smoked sheet usually contains about 93% rubber hydrocarbon, 4% acetone solubles, and 3% acetone-benzene insolubles. Ordinary resinous guayule rubber contains approximately 70% rubber hydrocarbon, 20% acetone solubles, and 10% acetone-benzene insolubles. *Hevea* rubber hydrocarbon and guayule rubber hydrocarbon are chemically identical in that they are both cis-polymers of isoprene (6) although their average molecular weights may differ. One might expect, on the basis of this, that the vulcanizing requirements for guayule would be the same as those for *Hevea*. Such has not been found to be the case in the work performed at this laboratory. The impurities of guayule rubber not only affect the physical properties of the vulcanizates, but also exert a considerable influence on the vulcanizing requirements of the rubber. These impurities, particularly the acetone solubles, are definitely not inert diluents, but, on the contrary, are quite reactive.

The purpose of this report is to describe some of the observations made at this laboratory on basic testing formulae. To keep the report as simple as possible, only results dealing with resinous guayule from young cultivated shrub will be considered.

Since the work was carried out over an extended period of time, it was not possible to use the same sample of rubber throughout. The samples actually used are designated by the field from which they were harvested, and their analyses are shown in Table 1. All of the samples of rubber used were taken from commercial production by this project except the *Hevea* brown crepe and Mexican resinous guayule, which were received from the Rubber Reserve Co.

TABLE 1. ANALYSES OF GUAYULE AND *Hevea* RUBBERS

Rubber	Guayule							<i>Hevea</i> Brown Crepe
	Bardin	Hammond	Guidotti	Arambel	Sterling	Delphia	Mexican	
RHC, %...	72.3	71.2	71.6	71.9	74.2	73.9	66.0	93.1
Acetone solubles, %	18.3	20.6	21.7	21.2	19.2	18.2	22.1	3.7
Acetone and benzene insolubles, %	9.4	8.2	6.7	6.9	6.6	7.9	11.9	3.2

Development of Testing Formulae

Wilfred F. L. Place¹
and Frederick E. Clark²

Compounding and testing were carried out according to A.S.T.M. procedures. All results are averages of tests with duplicate samples except those from DPG (diphenylguanidine) stocks.

American Chemical Society Formulae

A.C.S.-I formula, recommended in 1936 by the Crude Rubber Committee of the Rubber Division of the American Chemical Society, has been used successfully in testing plantation grades of *Hevea* rubbers. A.C.S.-II formula, also recommended by the same committee (7), is intended for testing wild rubbers and slow curing rubbers generally. When used with guayule rubber from Bardin Field, the results shown in Table 2 were obtained on these two formulae:

TABLE 2. A.C.S. FORMULAE

A.C.S. Formulae	I	II
Rubber	100.0	100.0
Zinc oxide	6.0	6.0
Sulfur	3.5	3.5
Stearic acid	0.5	4.0
Mercaptobenzothiazole (Captax)....	0.5	0.5

Physical Test Results with Both A.C.S. Formulae Using Guayule Rubber (Bardin Field)

Cure Min., at 260° F.	Formula I			Formula II		
	Tensile p.s.i.	Mod. at 500% E. p.s.i.	Ult. Elong. %	Tensile p.s.i.	Mod. at 500% E. p.s.i.	Ult. Elong. %
30	690	40	950	1025	150	890
45	...	...	...	1540	195	850
60	1005	65	915	1910	270	805
75	...	...	...	2175	300	805
90	1145	145	820	2135	345	785
120	1150	140	900	2370	365	805
150	1145	150	890	...	...	...

It is evident that the A.C.S.-I formula gives vulcanization products of little value. Much of the research of the Guayule Rubber Extraction Research Unit was designed to develop improved grades of guayule rubber. In research of this type it is not only necessary that the formula should be adapted to the requirements of the rubber to be vulcanized, but also that it should show real differences, where they exist, between samples prepared by different treatments. The A.C.S.-I formula performs neither of these functions with resinous guayule rubber.

Although the A.C.S.-II formula is a marked improvement over the A.C.S.-I, it does not develop a definite overcure. It is therefore very difficult to select an optimum cure using this formula; consequently the evaluation of various samples of guayule cannot be determined with accuracy. These observations are based on the large number of samples tested during the research and development program on guayule.

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² Formerly with Guayule Rubber Extraction Research Unit, now with Battelle Memorial Institute, Columbus, O.

³ Bibliography references appear at end of article.

Stearic Acid Variations

Table 3 shows the effect of increasing the stearic acid with guayule rubber (Bardin Field) on a base formula containing one part of mercaptobenzothiazole, (Captax). The tensile properties improve with increasing stearic acid up to five parts, although the improvement is not so apparent above three parts as it is under three parts. This point confirms the work of the Intercontinental Rubber Co. and of Hauser and le Beau who found that guayule rubber needs and can tolerate more stearic acid than *Hevea* rubber. The latter investigators further found that part of the stearic acid reacted with the so-called resin remaining in the desinated sample which they were using. This reaction partially accounts for the high stearic acid needed with guayule rubber. A contributing factor is the low acidity of guayule resin in contrast to *Hevea* resin which contains appreciable amounts of fatty acids. (8)

TABLE 3. STEARIC ACID VARIATIONS—GUAYULE RUBBER (Bardin Field)

Formulae									
Rubber	.....	100.0							
Sulfur	.....	3.5							
Zinc oxide	.....	6.0							
Mercaptobenzothiazole (Captax)	.....	1.0							
Stearic acid	.....	0 to 5.0							
Cure Min. at 287° F.		0	0.5	1.0	1.5	2.0	3.0	4.0	5.0
Tensile, p.s.i.	{ 10	1010	1270	1525	1670	1985	2115	2460	2330
	{ 20	1100	1655	2025	2245	2480	2745	2755	2885
	{ 30	1295	1860	1920	2015	2445	2495	2430	2535
	{ 45	1200	1800	1775	1945	2180	2320	2205	2390
Modulus at 500% elongation, p.s.i.	{ 10	45	60	100	115	140	205	255	230
	{ 20	50	110	145	165	215	280	315	315
	{ 30	70	95	140	160	220	285	310	350
	{ 45	45	115	155	140	185	265	285	320
Ultimate elongation, %	{ 10	915	905	880	860	885	860	880	865
	{ 20	920	930	895	890	880	875	850	850
	{ 30	955	950	885	860	890	850	815	795
	{ 45	955	945	890	885	890	850	795	795

A formula containing four parts of stearic acid was adopted as a standard by this laboratory and was designated the BAIC* formula. It has been used with success to test a great number of samples.

Sulfur Variations

The relation between tensile properties and sulfur content in the BAIC recipe was investigated, using Hammond Field rubber. The sulfur was varied from two to six parts, holding the other ingredients of the formula constant. The data obtained are shown in Table 4.

TABLE 4. SULFUR VARIATIONS—GUAYULE RUBBER (Hammond Field)

Formulae								
Rubber	.....	100.0						
Zinc oxide	.....	6.0						
Stearic acid	.....	4.0						
Mercaptobenzothiazole (Captax)	.....	1.0						
Sulfur	.....	2 to 6.0						
Cure, Min. at 287° F.		2	3	3.5	4	4.5	5	6
Tensile, p.s.i.	{ 30	550	1960	1945	1915	2030	2180	2630
	{ 60	1465	2305	2525	2530	2625	2550	2575
	{ 90	1610	2135	2420	2380	2440	2365	2470
	{ 120	120	220	235	265	410	440	590
Modulus at 500% elongation, p.s.i.	{ 30	5	140	130	130	170	200	225
	{ 60	100	180	195	235	300	310	390
	{ 90	120	220	235	265	410	440	590
	{ 120	120	220	235	265	410	440	590
Ultimate elongation, %	{ 30	1005	935	925	945	900	895	840
	{ 60	950	935	900	840	865	795	775
	{ 90	935	875	870	805	785	740	720
	{ 120	935	875	870	805	785	740	720

Tensile strength increases with increasing sulfur content up to 3.5 parts and then levels off; while the modulus increases up to six parts sulfur. Ultimate elongation decreases with increasing sulfur content, but is

still quite high at six parts. The formula with 3.5 parts sulfur is again the formula adopted by the BAIC. Although increasing the sulfur over 3.5-4 parts does not improve the rubber very much, it is apparent that resinous guayule can tolerate as much as six parts sulfur. Incidentally, very little sulfur-bloom was noticeable even at six parts sulfur. This amount is much more sulfur than is used in modern *Hevea* compounding practice.

Work at this laboratory has shown that some of the sulfur reacts with the guayule resin. The acetone extract of guayule, which has about the consistency of pine tar, was mixed with 1% and 2% sulfur and placed into a mold at a temperature and pressure corresponding to vulcanizing conditions. A hard plastic was formed. The 2% sulfur-mix was a little harder than the 1% sulfur-mix. Although a plastic was formed by heating the guayule resin without any sulfur, it took more heat and a longer time, and the end-product was softer. When 0.5% Captax was added to the mix, the reaction seemed to take place at a faster rate. These experiments were exploratory in nature, but seem to explain, in part at least, the tolerance which resinous guayule has for high sulfur.

Zinc Oxide Variations

The data in connection with variations in the amount of zinc oxide employed were not sufficiently significant to be presented here. Resinous guayule rubber is insensitive to small changes in zinc oxide content as long as an excess of zinc oxide is present to react with all of the stearic acid present and added.

Variation in Accelerator Content

The effect of varying the mercaptobenzothiazole (Captax) content in a formula containing four parts sulfur is shown in Table 5. Although no improvement is noted above 1-1.25 parts mercaptobenzothiazole, resinous guayule rubber can tolerate two parts Captax without harmful effects.

TABLE 5. VARIATION IN ACCELERATOR CONTENT—GUAYULE RUBBER (Hammond Field)

Formulae								
Rubber	.....	100.0						
Sulfur	.....	4.0						
Zinc oxide	.....	6.0						
Stearic acid	.....	4.0						
Mercaptobenzothiazole (Captax)	.....	0.5 to 2.0						
Cure, Min. at 287° F.		0.5	0.75	1.0	1.25	1.5	2.0	
Tensile, p.s.i.	{ 20	1230	1635	2005	2475	2440	2580	
	{ 30	1620	2245	2650	2955	2705	2825	
	{ 60	2260	2695	2780	2595	2805	2740	
	{ 90	2430	2720	2820	2575	2575	2445	
Modulus at 500% elongation, p.s.i.	{ 20	60	100	180	245	275	395	
	{ 30	120	215	355	350	430	580	
	{ 60	300	445	505	545	550	640	
	{ 90	400	515	505	540	605	625	
Ultimate elongation, %	{ 20	940	935	870	845	810	785	
	{ 30	920	865	820	850	785	765	
	{ 60	800	790	770	745	745	730	
	{ 90	780	765	755	740	715	715	

Effect of Antioxidant

When p-p'-diamine diphenyl methane (Tonox) is added to guayule rubber before drying to protect the rubber against oxidation, 0.5%, on the basis of the dry rubber, is usually used. Tonox, however, has a noticeable activating effect on the cure. In samples containing Tonox it has been found advisable to reduce the Captax to 0.5-part in order to obtain results comparable with those of the BAIC formula without Tonox. The formula then becomes identical, except for the Tonox, with the A.C.S.-II formula developed for wild rubbers low in fatty acid content. (7). Results with Bardin Field guayule rubber on these two formulae are given in Table 6.

* Bureau of Agricultural and Industrial Chemistry.

TABLE 6. EFFECT OF ANTIOXIDANT—GUAYULE RUBBER
(Bardin Field)

Formulae			
Rubber	100.0	100.0	
Sulfur	3.5	3.5	
Zinc oxide	6.0	6.0	
Stearic acid	4.0	4.0	
Mercaptobenzothiazole (Captax)	1.0	0.5	
p-p'-diamine diphenyl methane (Tonox)	0.0	0.5	
Tensile, p.s.i.	2190	2250	
	60 2665	2775	
	90 2455	2655	
Modulus at 500% elongation, p.s.i.	30 350	430	
	60 500	615	
	90 510	605	
Ultimate elongation, %	30 795	770	
	60 770	750	
	90 745	740	

TABLE 7. EFFECT OF DPG ACTIVATION

Formula						
Rubber	100.0					
Sulfur	3.5					
Zinc oxide	5.0					
Stearic acid	2.5					
Mercaptobenzothiazole (Captax)	0.8					
DPG	0.2					
p-p'-diamine diphenyl methane (Tonox)* (added before drying)	0.5					
Cure, Min. at 260° F.						
Tensile, p.s.i.	20 2570	2670	2730	2470	2185	
	30 2670	2980	2870	2640	2520	
	45 2870	2930	2950	2980	2545	
	60 2560	2870	2740	3130	2400	
	90 2380	2460	2620	2650	2165	
Modulus at 500% elongation, p.s.i.	20 270	430	400	590	330	
	30 390	500	540	800	535	
	45 470	520	640	820	615	
	60 420	550	670	860	635	
	90 440	520	680	770	570	
Ultimate elongation, %	20 810	750	770	700	800	
	30 780	780	740	680	735	
	45 770	760	720	700	720	
	60 750	750	700	690	705	
	90 730	710	700	670	690	

* No Tonox added to Mexican resinous guayule.

DPG Activation

The effect of several activators in a Captax formula has been investigated. Only the results obtained with diphenylguanidine (DPG) activation are reported here. Results obtained with five guayule rubbers on a specially adjusted DPG formula are shown in Table 7. All of the rubbers except Mexican resinous guayule contained 0.5% Tonox, which has an activating effect on cure, although the activating effect is not very great in a formula containing DPG. Experience during three years of testing at this laboratory has shown that this recipe brings out very well the physical properties of resinous guayule rubber. It is not, however, very good for routine testing as it tends to conceal differences

between samples from various lots. This type of formulation should nevertheless be useful to the user of resinous guayule rubber who wishes to obtain the best properties of the rubber and at the same time make his product as uniform as possible.

Table 8 shows the effect of DPG on a formula in which the sulfur has been increased slightly and the zinc oxide and stearic acid contents are the same as in the BAIC formula. Tonox was added on the compounding mill in the case of *Hevea*. This formula shows no appreciable improvement over the previous DPG formula. It is interesting to note that none of the guayule rubber tested shows any drastic overcure even at 90 minutes; *Hevea* brown crepe, on the other hand is badly overcured by this time. This fact alone will serve to explain the results for tensile strength, modulus, and elongation properties of this rubber on this formula.

TABLE 8. EFFECT OF DPG ACTIVATION

Formula						
Rubber	100.0					
Sulfur	3.75					
Zinc oxide	6.0					
Stearic acid	4.0					
Mercaptobenzothiazole (Captax)	0.8					
DPG	0.2					
p-p'-diamine diphenyl methane (Tonox)* (added before drying)	0.5					
Cure Min at 260° F.						
Tensile, p.s.i.	20 2400	2820	3090	2630	3070	
	30 2780	2940	2870	2980	3130	
	45 3100	3040	2850	2870	3150	
	60 2770	2820	2580	2910	2550	
	90 2670	2610	2660	2580	2500	
Modulus at 500% elongation, p.s.i.	20 280	360	520	430	2140	
	30 590	470	730	620	2450	
	45 600	550	850	750	2590	
	60 630	590	840	820	2550	
	90 610	540	780	810	2500	
Ultimate elongation, %	20 790	800	780	790	360	
	30 730	780	700	770	340	
	45 760	770	700	700	340	
	60 720	740	670	710	300	
	90 720	740	680	680	310	

* Added to *Hevea* during compounding.

TABLE 9. FORMULAE USED TO OBTAIN RESULTS SHOWN IN TABLE 10

Formulae	A	B	C
GR-S*	100	..	..
Guayule resinous†	..	100	100
EPC Black (Wyex)	50	50	50
Zinc oxide	5	5	5
Mercaptobenzothiazole (Captax)	1.5	1.5	1.5
Stearic acid	..	..	4
BRT #7	..	..	..
Sulfur	2	2	3.5

* This sample of GR-S received from Reserve meets specifications as set up by Rubber Reserve.

† From Bardin Field. Rubber processed at Spence Mill. No antioxidant added. Chemical analysis: Rubber hydrocarbon, % 72.3; Acetone solubles, % 18.3; Acetone-benzene insolubles, % 9.4.

TABLE 10. COMPARISON OF GUAYULE AND GR-S

	GR-S on Formula A				Guayule on Formula B					Guayule on Formula C				
	50	60	70	90	30	40	50	60	75	20	30	40	50	60
Cure, Min. at 287° F.	2680	2900	2940	2800	1310	1230	1230	1120	1070	2230	2200	2210	2150	2110
Tensile, p.s.i.	870	1050	1230	1450	390	380	350	340	230	850	970	1080	1070	1090
Modulus at 300% elongation	620	590	560	500	600	610	630	630	660	560	530	500	490	490
% elongation	53	55	55	59	44	44	44	42	40	60	60	62	64	62
Hardness, Shore (30")*	12	9	9	9	25	28	31	28	31	37	37	37	31	31
Permanent set, %	193	200	194	168	92	87	90	82	81	147	139	133	127	124
Tensile product/100†	298	298	298	298	160	160	160	160	160	487	487	487	487	487
Tear (p.i.)	33	33	33	33	390	390	390	390	390	1250	1250	1250	1250	1250
Hot tensile, p.s.i.‡	63	63	63	63	17	17	17	17	17	23	23	23	23	23
Cure, min. at 287° F.	75	75	75	75	45	45	45	45	45	35	35	35	35	35
Abrasion (% of standard)§	40	40	40	40	31	31	31	31	31	33	33	33	33	33
Cure, min. at 287° F.	152	152	152	152	123	123	123	123	123	76	76	76	76	76
Rebound, %, Goodyear-Healy														
Heat build up, Goodrich flexometer ΔT (°F.)¶														

* Hardness taken after 30 seconds.

† Tensile × (1 + E in inches)

‡ Tensile product = $\frac{100}{\text{Tensile} \times (1 + E \text{ in inches})}$

§ Hot tensile—performed with hot iron at 230° F. corresponds approximately to air-conditioned tensile test at 212° F., after "A Simplified Hot Tensile Test for GR-S" by H. A. Braendle, E. Volden, and W. B. Wiegand (-10).

¶ Bureau of Standards abrader—Results reported as % of standard *Hevea* compound.

|| Temperature rise over room temperature at blowout. In case sample did not blow out—temperature rise over room temperature after one hour. Load, 118 pounds per square inch, 0.25-inch stroke.

Guayule and GR-S

An enlightening example of the importance of proper compounding for guayule rubber is shown in comparisons of guayule and GR-S. It is well known that in order to obtain useful data on GR-S compounding a special formula had to be designed. The A.C.S. formulae, although satisfactory for evaluation of samples of plantation and wild rubbers, are not suitable for the evaluation of GR-S samples. Consequently Rubber Reserve Co. agreed on what is now known as the standard Rubber Reserve Co. formula for GR-S testing. Without such a formula one can feel certain that the rapid development and improvement in GR-S manufacture would not have been attained.

In the course of a study to evaluate blends of GR-S and guayule rubber (9) it was thought of interest to test guayule on the Rubber Reserve formula for GR-S. At the same time, for comparison, the same guayule rubber was compounded using a formula (C) more adapted to the requirements of guayule. The formulae used appear in Table 9, and the physical properties of the vulcanizates obtained are shown in Table 10. It can be seen that, because of the lack of stearic acid and of sufficient sulfur in formula B, the physical properties shown by guayule rubber on this formula are worthless for proper evaluation.

Summary and Conclusions

1. Although commercial guayule rubber cannot be made to equal to *Hevea* rubber without removing certain of the existing impurities, noticeable improvement can be effected through correct compounding.

2. Resinous guayule rubber requires and can tolerate more sulfur and acceleration than the ordinary plantation grades of *Hevea* rubber.

3. Resinous guayule rubber requires more stearic acid than *Hevea* rubber.

4. The non-rubber constituents in present-day resinous guayule rubber react during vulcanization with certain of the ingredients added.

5. For routine evaluation of resinous guayule rubber, where it is desirable to obtain good physical properties and at the same time show up differences between samples, the following formula is recommended: six parts zinc oxide, three to five parts stearic acid, 3.5-4 parts sulfur, and 1-1.25 parts mercaptobenzothiazole per 100 parts of rubber.

6. To bring out the best physical properties and produce uniformity among different lots of resinous guayule rubber, an activator, such as diphenylguanidine, should be used.

7. The standard GR-S formula is not satisfactory for guayule; therefore the simple replacement of one rubber by the other in blends of GR-S and guayule, without adjustment and compensation in the formula, is unsatisfactory from a vulcanization standpoint.

8. The results substantiate very clearly the need of further study of this subject and for the development of still better formulae for guayule rubbers. Furthermore the relative merits of other vulcanizing agents and combinations of the same should be studied. This is particularly true when it comes to blends of GR-S and guayule. (9)

9. It is quite evident that the formulae, which have been in use over the years for the testing of *Hevea* samples and more recently GR-S samples, are entirely inadequate when applied to guayule rubber as currently produced, whether owing to the large percentage of non-rubber constituents, or in consequence of their nature or character. It would seem worth while therefore

for an official body, such as the Crude Rubber Committee of the Division of Rubber Chemistry of the American Chemical Society, to continue this evaluation program to a satisfactory completion until a formula adapted to guayule rubber, as currently produced, has been developed.

Acknowledgments

The authors wish to express their gratitude to David Spence whose assistance and encouragement were of great help in conducting this study. Acknowledgment is also due to members of the Guayule Rubber Extraction Research Unit.

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Preservation and Storage

(Continued from page 363)

the latex. This difficulty can readily be overcome by the proper purification of the latex itself. One of the best ways to recream the latex. This is not too expensive and will put the latex in condition so that it can be used as readily as a new or a recently tapped latex.

There may be conditions when the whole quantity of latex does not need to be recream, and it is only necessary to recream part of the latex and then mix the two parts together. To one experienced in the art, it would be very simple to employ this recream process to advantage under almost any circumstances which are usually met.

Research Leading to Butadiene

(Continued from page 369)

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"A Trip through Hercules Land." Hercules Powder Co., Wilmington 99, Del. 20 pages. This non-technical, profusely illustrated booklet explains how Hercules products are utilized in 12 major industries, including adhesives, protective coatings, synthetic fibers, plastics, soap and disinfectants, insecticides, rubber, ink, construction, textiles, paper, and mining. A map of "Hercules Land" is given on the cover

EDITORIALS

Outlook for Business in 1947

AS THE first postwar year of 1946 draws to a close, it is natural to view in retrospect the happenings of the year that has just passed and attempt to estimate the trends for the coming year and to adjust business policy accordingly. At a meeting in New York on November 19 the National Industrial Conference Board at its general session heard John D. Small, Civilian Production Administrator, Marvin E. Coyle, vice president, General Motors Corp.; and Harvey S. Firestone, Jr., president, Firestone Tire & Rubber Co., discuss the subject of "The Outlook for Business in 1947." Certain especially pertinent comments by each of these speakers will be repeated herewith, but first we feel that a brief review of the most important happenings in the rubber industry during 1946 should be made, in order that the thoughts contained in the comments of these industry and government leaders may be considered more particularly in relation to trends in the rubber industry.

As the year 1946 began, rubber industry leaders were generally optimistic for a year of record-breaking production in established lines, but expressed doubt as to any appreciable output of new products until 1947. It was realized that the synthetic rubber passenger-car tire would have its first real test during 1946. The amount of natural rubber available during 1946 was under-estimated, and the industry was somewhat apprehensive regarding continued labor peace. As the year moved along, the rubber industry was more fortunate than other industries in avoiding any extended shutdowns, and the "Big Four" agreement of March and the increase of 18½¢ an hour in wage rates granted at that time were primarily responsible for this fortunate situation.

The amount of natural rubber that became available from the Far East permitted more rapid increases in the proportion of this rubber that could be used in various products than had originally been considered possible. With the government relinquishing most of its controls over industry following the results of the November election, the need of early action by Congress on a national rubber policy became of vital importance. It became evident that the problems of the disposal of the synthetic rubber plants, the public purchase program of natural rubber, and the authority to allocate rubber supplies were so interrelated that no decision could be made on any of these problems separately. Unfortunately, something of an impasse developed here since the industry has exhibited a reluctance to make suggestions on these matters until the Inter-Agency Policy Committee on Rubber makes more definite recommendations of its idea of policy known.

Earlier than expected, GR-S demonstrated its ability to act as a brake on mounting natural rubber prices.

The poor quality of the natural rubber allocated to rubber goods manufacturers during the greater part of the year made this rubber less useful in maintaining high production rates than GR-S. The synthetic rubber passenger-car tire, as R. P. Dinsmore, vice president, Goodyear Tire & Rubber Co., in a talk which appears elsewhere in this issue puts it, "is no longer in the amateur class and is not going to require very much natural rubber to make it completely competitive."

Although organized labor in the rubber industry has been pressing for another round of wage increases, and in November the nation was confronted with the second strike of soft coal miners during the year, the business outlook for 1947 still seemed encouraging. There is a slowness in some industries due largely to labor difficulties in basic material industries and in component plants resulting in unbalanced flow of materials and parts, but, by and large, in terms of production, things are going well today and can continue to go well if the industrial boat is not rocked by runaway prices or major work stoppages, CPA Administrator Small said in his talk before the Conference Board. Both can be avoided if management and labor both use restraint, common sense, and good judgment, he added.

In the first six months of 1947 we in the industry have hopes of exceeding the prevailing or current rate of production, said Mr. Coyle in his talk before the Conference Board. Naturally there has been much consideration given to the effect of price on volume. Every industry must recover its cost in its selling price. Failure to do so by even the slightest margin means that you are distributing some part of your capital with each sale. Cost regulates price, and price regulates volume. Volume regulates employment, and if we have a full measure of employment, we must keep of necessity our prices as low as we can.

Mr. Firestone in his talk before the Conference Board also mentioned the possibility of a "boom and bust" period in 1947, but said that whether or not we succeed in avoiding this period depends on how good a job management and labor do in producing goods efficiently, the kind of environment that business has in which to operate, and how successful industry is in developing new and better products and marketing them aggressively at low prices. We must put more emphasis on sales training, and, finally, if free enterprise is to survive, industry must succeed, Mr. Firestone said.

It may be concluded, therefore, that if the recommendations of these industry and government leaders are followed, and, if the present coal strike is settled within a reasonably short time, American industry in general, and the rubber industry, in particular, should experience a very good year in 1947. It is hoped that during 1947 a greater degree of return to the American system of free enterprise will be achieved so that it will be able again to demonstrate its superiority to other economic systems. In this connection and in closing, INDIA RUBBER WORLD wishes to extend to the rubber and associated industries, Holiday Greetings and best wishes for a Happy and Prosperous New Year.

Scientific and Technical Activities

Rubber Reserve Safety Conference

THE 1946 Fall Safety and Fire Conference of the Office of Rubber Reserve, Reconstruction Finance Corp., was held November 13 to 15 in the Federal Room of the Hotel Statler, Washington, D. C. A total registration of approximately 120 was recorded, including many plant managers and superintendents in addition to safety directors and engineers of the operating companies. Each day's program included two parts: the first, a general assembly at which papers were presented; and the second, a series of group discussions. There was also a display of safety devices and procedures of the operating companies. The high level of participation and timeliness of discussion problems of the conference were such as to make it the most successful by far of the series.

General Assemblies

The first assembly, immediately following registration, was held under the chairmanship of John T. Howell, assistant manager of Rubber Reserve's Safety Section, who welcomed the assemblage after an invocation given by the Rev. Maurice S. Sheehy. Three papers were presented during the course of the session. The first, "Safety and Production," was given by W. R. Hucks, manager of Rubber Reserve's Synthetic Rubber Section. In his talk Mr. Hucks decried the belief in production in spite of safety. He emphasized that plant efficiency, and therefore production, and safety were correlated and pointed to the need of a continuing and positive safety program. Although noting the safety records achieved by the operating companies, he warned that "nothing wilts laurels as quickly as resting on them."

H. Walter Johnson, manager of the insurance department of Sun Oil Co., Philadelphia, Pa., spoke on "The Relation of Safety to Economics of Insurance." After sketching the history and development of the modern forms of insurance, the speaker gave accident and death statistics in occupational fields. He emphasized the need of adequate safety programs as being of importance to management in reducing insurance rates. The final paper of this initial session, entitled "Past, Present, Future," was read by Edward S. Webb, assistant to the president, National Safety Council, Chicago, Ill. Speaking of the past, Mr. Webb pointed to the rubber industry's outstanding safety record, ranking third in the nation according to Department of Labor statistics. Regarding the present and future outlook, the speaker deplored the dollar-and-cents idea of safety. Greater recognition is needed of the safety director, who should be part of top management. Labor recognizes this need and may eventually force this recognition on management if not voluntarily given. Mr. Webb also discussed the services of the National Safety Council and urged the members to take advantage of these services. He praised the outstanding safety record of the National Synthetic Rubber Corp., Louisville, Ky., which has achieved 1,515,000 man-hours of work without an injury. In recognition of this feat, he presented the Safety Council's plaque and pennant to B. J.

Oakes, vice president of National Synthetic.

The next general assembly, held the afternoon of November 14, was under the chairmanship of H. R. Gaetz, superintendent of the Naugatuck, Conn., plant of the United States Rubber Co., with Dr. Oakes as vice chairman. G. A. Balzerson, safety engineer of the B. F. Goodrich Chemical Co. plant at Port Neches, Tex., presented a motion picture, "Clean Waters." This film showed some of the myriad uses of water both in industry and for other purposes, types and methods of pollution, and explained the methods for purification of water and removal of pollution.

Following the film was a symposium on eye protection, under the leadership of A. P. Alleman, safety supervisor of Humble Oil & Refining Co., Baytown, Tex. Blindfolds were distributed, and the assemblage was requested to wear them throughout the symposium, which lasted about one hour, in order to bring home the results of faulty eye protection.

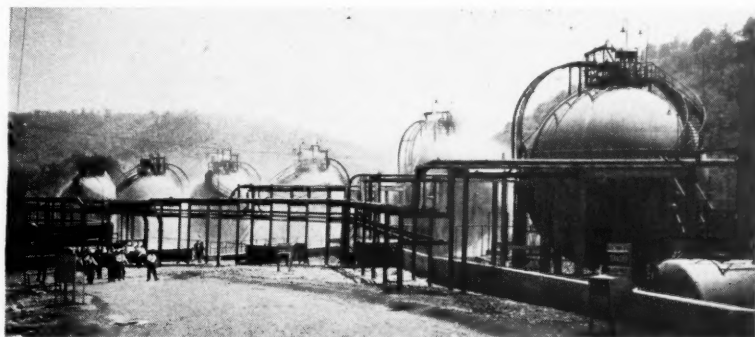
Papers presented during this symposium included "Symposium on Eye Protection" by Mr. Alleman; "Chemical Goggles Save Eye at Plains Plant," L. A. Webber, Phillips Petroleum Co., Borger, Tex.; "Safety Department Report on Eye Protection Program," E. E. Edmondson, Jr., Neches Butane Products Co., Port Neches; "The Prevention of Eye Injuries," Luther E. Hall, safety inspector of Sinclair Rubber, Inc., Houston, Tex.; and "Eye Protection" by a representative of the Goodyear Synthetic Rubber Corp., Houston.

After a short recess the assembly reconvened to hear a paper on "Organizing for Equipment Inspection" by Arthur P. Dunlap, superintendent of the equipment test and inspection division of Carbide & Carbon Chemicals Corp., Oak Ridge, Tenn. Mr. Dunlap emphasized the importance of a properly staffed and organized equipment inspection department in any plant for production efficiency and safety. Such an inspection department, besides receiving inspection of equipment, based on service requirements, would also provide information on equipment limitations, maintenance instructions and schedules, and reinspection schedules for each piece of equipment. The primary responsibility for proper use of

equipment would still rest on the operating department and its personnel, which must assist in the development of equipment records, new equipment designs, and the investigation of equipment failures, and in the establishment of operating standards. The speaker stressed the need of adequate plant equipment records, based on inspection records and work orders for equipment repairs. In the case of equipment failures, he advocated a type of work order that would give the operator a stake in finding the cause of the failure, with no emphasis on blame finding. He also noted another function of a satisfactory equipment inspection department often overlooked: that of decontaminating outworn or faulty equipment before disposal. As for the place of such an inspection department in a plant organization, its functions are those of advisory management and should therefore be directly under the plant manager and not made part of the engineering or production departments. The final paper of the session, "Safety in Fire Control," was presented by Earl E. Taylor, safety engineer of the Southern California Gas Co., and discussed the equipment and methods needed for proper fire control in a plant.

On the evening of November 14 a testimonial dinner was given to A. B. Pettit, retiring manager of Rubber Reserve's Safety Section. Mr. Pettit, whose resignation was effective November 16, was the recipient of a gift, a finger ring, as well as many expressions of appreciation for his work in leading the synthetic rubber safety program.

The final general assembly took place the afternoon of November 15, with H. H. Smith, plant manager of Dow Chemical Co., Los Angeles, Calif., as chairman, and C. V. Dille production superintendent of Firestone Tire & Rubber Co., Lake Charles, La., as vice chairman. Mr. Howell read a paper on "Reduction of Accidents through Removal of Unsafe Practices" by J. F. Agar, general plant personnel supervisor of the Michigan Bell Telephone Co., who was unable to appear. The steps for an accident reduction program were given as follows: develop a basic program; sell the program to both labor and management; prepare safe work practices for each job; train employees in safe practices; keep hammering away at the program continuously; train foremen to see what they look at, and to avoid mental sets in ana-



Photograph Showing Use of Water Fog and Spray Installation around Butadiene Gas Spheres to Disperse Gas Vapors in the Event of a Leak

lyzing a job; find causes for existing mental sets; and, finally, cure these sets by eliminating the causative agents. Following this paper, S. L. Rankin, M.D., medical director for the Louisville, Ky., plant of E. I. du Pont de Nemours & Co., Inc., spoke on "Preventive Industrial Medicine." After reviewing the history and growth of industrial medicine, Dr. Rankin emphasized that modern industrial medicine is preventive medicine and is a field of specialization not in competition with the private practitioner. The industrial doctor is primarily concerned with maintaining health and employs for this purpose such methods as examinations, dispensary work, visiting nurse service, plant hygiene, nutrition tests, contact with family physicians, blood, water, and X-ray tests, and plant inspection and safety. He noted that the modern industrial physician works hand in hand with the safety director.

After a short recess, a short talk on the need of continuing the synthetic rubber program was given by G. B. Hadlock, executive director of Rubber Reserve, who stated that, in accordance with existing regulations on disposal of government plants there would presently commence a series of disposal advertisements on the government rubber plants. He emphasized that these advertisements were purely routine and warned against employees becoming alarmed at the idea of immediate sale of the plants. Such sales were not foreseen for the immediate future and were still awaiting policy decision.

Mr. Hadlock then introduced the featured speaker, John D. Small, CPA Administrator. Mr. Small gave a short summary of present general business conditions and spoke optimistically of the future. He deplored talk of an inevitable recession and foresaw no change in present prosperity, with the only problems being those of prices and of the labor-management situation. He warned that business indices would show a drop this year-end because production is now at its ceiling and unable to make the usual year-end seasonal rise. Following Mr. Small's talk, closing remarks were given by Frank T. Carpenter, the first Rubber Reserve Safety Section manager, and by Messrs. Pettit and Howell.

Group Discussions

The group discussions were held on the afternoon of November 13 and the mornings of November 14 and 15, with three groups meeting concurrently. The first, the Copolymer Discussion Group, was held under the chairmanship of I. E. Miller, manager of the Goodrich Chemical plant at Port Neches. C. H. Smith, manager of the Goodyear Synthetic plant at Houston, was to have acted as vice chairman, but was unable to attend the conference. The second group, the Hydrocarbon and Chemicals Discussion Group, was under the chairmanship of E. S. Bodine, manager of Shell Chemical Corp., Torrance, Calif., with G. J. Ratcliffe, superintendent of utilities and industrial relations, Carbide & Carbon Chemicals Corp., Institute, W. Va., acting as vice chairman. The third group, the Fire Chief's Discussion Group, was held under the chairmanship of C. F. Cook, safety director of the du Pont plant at Louisville, with D. L. Atkinson, director of personnel and safety of Sinclair Rubber, Houston, as vice chairman.

Each group discussed problems submitted by the member companies. The discussions were therefore timely and of

importance and covered such fields as personnel safety, processing operations safety (the problems in these first two fields being identical for the three groups), process maintenance safety, process design safety, and fire protection for process safety.

Under personnel safety, problems discussed included the desirability of requiring previous accident records of prospective employees; the scope of induction information and training on plant policies for new employees; the value of physical examinations; the comparative values of plant *versus* departmental safety meetings; type of employee representation on safety committees; methods of promoting better safety training; the use of visual education methods to stimulate interest; the role of the safety department in maintaining and issuing personalized safety equipment; and the use of departmental labor stewards in safety programs. Problems discussed under processing operations safety included methods for protection of plant personnel and property during serious gas escapes; the use of water for dispersion butadiene gas; storage, maintenance, and types of gas masks; the value of recording gas indicators and combustible gas alarms; methods for safe handling of gas tank cars; maintenance and use of pressure relief valves; methods for controlling formation of butadiene peroxides (the use of caustic was shown to be unsatisfactory for rendering the peroxides inert); dilute aqueous solutions of sodium hyposulfite or sodium nitrite were recommended on the basis of company tests; and methods of testing for peroxides in solid polymer.

In the field of process maintenance safety such problems were discussed as spontaneous combustion of popcorn polymer; methods for removing residue from knockout drums and similar vessels; procedures for inspecting and testing pressure tank cars; policies on the inspection and maintenance of tools and rigging equipment; methods of inspecting relief valves; procedures for grounding equipment; and the use of non-sparking tools in hazardous areas. Topics discussed under process design safety included methods of protecting spare pumps from excessive hydrostatic pressure; and protection methods in design of continuous concentrated sulfuric acid injection systems. Under fire protection for process safety, topics discussed included the relative values of full-time firemen as against auxiliary fire brigades; the use of open-tip hose nozzles and spray or fog nozzles; and methods of checking delivery trucks in and out of hazardous plant areas.

Safety Displays

The safety displays included photographs on the use and value of color engineering; the use of safety displays and slogans throughout the plant; a bottle jacket to prevent shattering of glass bottles during polymerization, used in the polymerization research laboratory of Naugatuck Chemical; photographs of a Naugatuck installation of a knee trip safety stop on laboratory and plant mills; photographs and specifications for a mast and boom developed by Naugatuck for cleaning and inspection of gas spheres; photographs of the assembly and use of water fog nozzles on deluge sets for protecting outside rubber storage, and the use of water fog and spray for protecting gas spheres; and a graphic illustration of the value of goggles in preventing eye injury during an actual plant accident.

High Polymers Lecture Series

A SERIES of lectures at the National Bureau of Standards, Washington, D. C., dealing with the chemistry and physics of high polymers was recently announced by E. U. Condon, director of the Bureau. The lectures, continuing the seminar presented last year, will be given by the nation's leading scientists in this field from industry and university. Arranged by Robert Simha, of the Bureau's division of organic and fibrous materials, the lectures are open to the public without charge and will be held from 7:00 to 9:00 p.m. in Room 214 of the Bureau's Chemistry Bldg. The program follows:

November 22: "Theories of Fractional Precipitation of High Polymers as Applied to Cellulose Esters," by D. R. Morey, Eastman Kodak Co.

December 13: "Visco-Elastic Properties of Polymer Solutions," J. D. Ferry, University of Wisconsin.

January 22: "On Quantum Mechanisms of a Macroscopic Scale," F. W. London, Duke University.

January 30: "Applications of Magnetochemistry to Polymers and Polymerization," P. W. Selwood, Northwestern University.

February 27: "Physical Chemistry of Collagen," by J. H. Highberger, General Dyestuff Corp.

March 6: "Solution Properties of Cellulose Derivatives—Correlation with Physical Properties," H. M. Spurlin, Hercules Powder Co.

March 28: "Effects of Low Temperature on High Elasticity of Rubbers," S. D. Gehman, Goodyear Tire & Rubber Co.

April 24: "Elasticity and Plasticity of High Polymers," H. Lederman, Firestone Tire & Rubber Co.

May 8: "Electrical Properties of Polymers," R. M. Fuoss, Yale University.

May 29: "Polar Coordination in Solid Polymers," W. O. Baker, Bell Telephone Laboratories.

June 5: "Optical Investigations on Polymers," W. Heller, Wayne University.

June 12: "Discoloration of Polymers," R. F. Boyer, Dow Chemical Co.

Rubber Naming Committee

IN AUGUST, 1946, the participants in the government rubber program were invited to select a name for their own product, in line with the belief that something should be done about the inaccurate term "synthetic rubber," with its attendant implication of being an inferior substitute for natural rubber. This committee, known as Committee for Naming Synthetic Rubber, Washington, D. C., under the chairmanship of I. H. Fooshee, with A. B. Pettit acting as secretary, consisted of G. R. Lyon, W. W. Scull, J. E. Mitchell, and R. W. Kirm.

The majority of those participating in the government program responded to the solicitation for names, and a list of five names was selected therefrom by the committee and forwarded to The Rubber Manufacturers Association, Inc., New York, for final selection. At the same time another list of five names is being selected by the RMA itself, and a third list of five names is under selection by the Division of Rubber Chemistry, A.C.S. These three lists, comprising 15 names, will be submitted to the board of directors of the RMA for final selection of the new name for synthetic rubber.

Du Pont Program at Akron Group Meeting

THE meeting of the Akron Rubber Group at the Mayflower Hotel, Akron, O., November 22, was featured by a special program arranged by the rubber chemicals division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., by virtue of the formal opening of a new rubber service laboratory in Akron by that company on the same day. Group Chairman Jack Moore, of Standard Chemical Co., presided at the meeting and after disposing of matters of business of special interest to the Group members and introducing Harry E. Outcalt, of St. Joseph Lead Co., vice chairman of the Division of Rubber Chemistry, A. C. S., who spoke briefly on the activities of the Rubber Division and their relation to activities of the ten local rubber groups, Mr. Moore then turned the meeting over to E. R. Bridgwater, manager of du Pont's rubber chemicals division.

The Du Pont Program

Mr. Bridgwater, after thanking the officers and members of the Akron Group for their kindness in turning the meeting over to the du Pont company, called attention to the fact that about 25 years ago, when the American organic chemical industry was very young, du Pont recognized the rubber industry as an important potential consumer of chemicals and undertook a program of research on chemicals for its use. On one particular occasion—15 years ago this very month—we had the privilege of announcing at a meeting of the Akron Section, A. C. S., the development of a new synthetic rubber which we thought was superior to natural rubber in some respects, Mr. Bridgwater said. Despite the difficulties of those times, manufacturers in the Akron area who attended that meeting wanted to know how soon du Pont could supply substantial quantities of this synthetic rubber in order that they might give their customers better finished products, and the output of the small plant which had then just been completed was snapped up as soon as it was available, and since then the American rubber industry has used hundreds of thousands of tons of neoprene.

Mr. Bridgwater also complimented the rubber industry on its forward-looking attitude with regard to research and its contribution to our national safety and to the winning of the war and then explained that in order to enable du Pont better to perform its small part in helping the industry to improve the quality of its products and reduce their cost to the consuming public, the company had established its Akron laboratory and staffed it with men whose job it will be to apply to rubber industry problems the chemical knowledge developed in the du Pont laboratories in Wilmington and elsewhere. He next introduced Charles J. Mighton, who spoke on "New Outlets for Rubber through Latex," and Embert L. Stangor, who spoke on "Backrinding of Molded Products." Both these men are part of the staff of the new Akron laboratory. Dr. Mighton as laboratory manager, and Mr. Stangor as rubber technologist.

Dr. Mighton traced the growth of rubber manufacturing processes involving the use of natural and synthetic latices from the early 1920's when latex was adopted to a limited extent for the

manufacture of dipped goods, for proofings or saturating, and for some adhesives. He made special mention of the development of latex foam sponge and latex-bonded fibers for cushioning of all kinds. During the war newly developed synthetic latices of necessity replaced the natural product in practically all applications, and it was found that many products made from synthetic latex had advantages over those made from the natural product, Dr. Mighton said.

The advent of synthetic latices has enabled rubber processors to offer their customers products having better aging properties, heat resistance, oil resistance, and sunlight resistance than they could if natural rubber were the only available elastomer and so strengthen their competitive position with respect to other materials of construction. Manufacturers of synthetic latices have thus far been pretty well absorbed with problems having to do with volume and uniformity of production and have not had an opportunity to discover how far they can go in the direction of producing tailor-made latices to suit specific fabricating requirements. Also, there has been little done thus far in the direction of producing reinforcing pigments and other compounding ingredients designed specifically for latex uses. Research on synthetic elastomers and latices has already reached the stage where new molecule building is almost a daily occurrence, and many of these new elastomers and latices will mean additional new business for our industry and more interesting jobs for all of us, Dr. Mighton concluded.¹

Mr. Stangor in his paper first mentioned that defects in molded rubber products have always been a source of annoyance and loss to manufacturers of rubber goods, and one of these defects which occurs with distressing frequency is known as backrinding, the term used to indicate the torn or gouged condition which occasionally appears at or near the mold parting line on a vulcanized article. Studies made in the laboratory indicate that backrinding is caused by a sudden release of internal pressure resulting from the thermal expansion of the compound during its rise to curing temperature. When the mold is opened, the internal pressure forces the vulcanized compound past the sharp edges of the parting line of the mold and results in a torn or gouged finished article. Several factors influence backrinding, Mr. Stangor explained. The use of an excessive amount of compound in relation to the mold cavity may result in backrinding, and the elastomer content and the type of filler used have definite effects. Increasing the content of inert filler in the composition tends to decrease backrinding, and since some fillers have lower thermal expansion than others, their use, if practical, will minimize backrinding. It was emphasized that it was with the pure gum type of compound that the greatest difficulty was experienced in preventing backrinding.

Curing at lower temperatures or preheating the unvulcanized stock produces less thermal expansion and, hence, is favorable to the control of backrinding.

Cooling the mold under pressure completely eliminates it, but obviously this method can be used only infrequently because of the reduction of production rate. The amount of pressure on the press platens has no effect, but must, of course, be high enough to keep the mold tightly closed throughout the cure. Manufacturers of molded articles can solve most backrinding problems by bearing in mind that the mold should be designed to avoid localized distortion of the article when the mold is opened at the end of the cure. The design of molds is best done by the rubber manufacturer who knows the requirements of rubber molds and can design them in a manner to produce fewer defective products, which in turn result in lower costs to the consumer, Stangor concluded.²

The Business Meeting

At the business of meeting of the Group, which took place immediately after dinner, Chairman Moore called on Henry F. Palmer, secretary-treasurer of the Group, for the financial report. After this report it was announced that a program committee consisting of R. Appleby, du Pont, chairman; J. Fielding, Goodyear Tire & Rubber Co.; H. Ebright, Firestone Tire & Rubber Co.; and H. Catt, B. F. Goodrich Co.; had been appointed for the coming year. Mr. Appleby announced that dates for two meetings in 1947, one on February 21 and the other on May 9, had been selected, but that no details of the program for these meetings had as yet been decided. A publicity committee consisting of R. H. Crossley, Caldwell Co., and J. Kersch, Goodyear, was also appointed for the coming year. Additions to the executive committee of the Group were, W. Krantz, Goodyear, and E. Busenberg, Goodrich. Mr. Moore also stated that it had been decided to appoint a committee to investigate the desirability of drawing up a constitution for the Group and to prepare such a constitution for consideration by the members. This committee consists of R. Yohe, American Anode, Inc., as chairman; A. E. Sidnell, Seiberling Latex Products Co., Inc.; W. W. Vogt, Goodyear; and Sid Kuykendahl, Firestone.

It was announced that a record attendance of about 400 members and guests were present at the meeting.

Conductive Rubber Committee

INCREASING interest in so-called "conductive rubber," a product which, in contrast to the usual types of rubber, is a conductor of electricity and is coming into widespread usage, particularly in automotive and related applications, has led Technical Committee A to organize a new committee on this material. S. R. Doner, of Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., is the chairman of the group which is functioning under A.S.T.M. Section 4, concerned with the classification and specifications of rubber compounds. Technical Committee A is sponsored by the Society of Automotive Engineers and the American Society for Testing Materials and is part of A.S.T.M. Technical Committee D-11 on Rubber and Rubber-Like Materials.

¹ This paper will be published in an early issue of India RUBBER WORLD.

² This paper will be published in Rubber Age.

Dow Receives Medal

WILLARD H. DOW, president of Dow Chemical Co., Midland, Mich., was presented with the Chemical Industry Medal of the Society of Chemical Industry at a dinner at the Commodore Hotel, New York, N. Y., on November 8. The medal was the second honor given Mr. Dow that day; he also received the "Man of Science" award of *Science Illustrated*, at a luncheon, for outstanding use of science in industry. The S.C.I. medal was presented to Mr. Dow by Francis J. Curtis, vice president of Monsanto Chemical Co. and a member of the executive committee of the American Section of the Society of Chemical Industry. William J. Hale, research consultant for Dow Chemical, had previously spoken on the personal side of the medalist, and Gen. Alden H. Waitt, Chief of the Chemical Corps, discussed the professional side of the medalist, pointing up many of Dow Chemical's wartime contributions, particularly the production of magnesium and of styrene for synthetic rubber.

In his acceptance speech, "Salts of the Earth," Mr. Dow called for a new appraisal of the true values of human endeavor, saying, "We have dwelt too much and too long on success in terms of the dollar, too little in terms of humanities."

He cited industrial growth and progress as the vital constructive force of a free people which has given them the highest standard of living in the world. He noted that although people are willing to laud the scientists and inventors of history for what they gave to humanity, there is a tendency to scrutinize all present-day effort for the profit motive. Looking toward the future, the speaker voiced his belief that progress boils down to the abandonment of false ideologies, the acceptance of responsibility, and, most of all, hard work.

"Our civilization is enlightened chemically, physically, and mechanically, but not spiritually," Mr. Dow concluded. "It is time to forsake false issues and return to fundamental thinking."

American Rubbers Discussed

FRANK K. SCHOENFELD, technical vice president of B. F. Goodrich Chemical Co., spoke on "American Rubbers" before a joint meeting of the Ontario Rubber Section and the Wellington-Waterloo Section, C.I.C., on November 14. The meeting, attended by 48 members, was held at Walper House, Kitchener, Ont., Canada, and was preceded by a visit to the Naugatuck Chemical Co. plant at Elmira, Ont., and a dinner.

Dr. Schoenfeld reviewed and illustrated the growth of the use of natural rubber and the history and development of synthetic rubber up to 1941. He stated that better synthetic rubbers than those now available have been produced, but will not be marketed until the proper processing equipment has been developed. In comparing natural with synthetic rubber, the speaker stated that GR-S is better in passenger-car tires, but inferior in truck tires; yet, on the whole, natural rubber is superior to synthetic. He also declared that three types of synthetic, Butyl, neoprene, and nitrile rubbers, were here to stay, regardless of price and availability

of natural rubber. Nitrile rubbers, such as Goodrich's Hycar, when mixed with polyvinyl chloride, give non-bleeding compounds which outwear leather twelve to one. However mixtures with PVC and the general line of liquid plasticizers do not give such compounds. Combinations of phenolic resins with Hycar give a product having wear resistance superior to that of leather. Dr. Schoenfeld, in speaking of new products, mentioned his company's polyethylene polysulfide, a new insecticide which will reduce the number of required sprayings of fruit orchards to two or three times a year. Another Goodrich product soon to be available is a saturated chemical with rubber-like properties which does not require use of antioxidants or vulcanization and will withstand temperatures up to 300° F.

The next meeting of the Ontario Rubber Section will take place December 4, at Hart House, University of Toronto. At this meeting, W. S. Clarkson, of Canadian Westinghouse Co., Ltd., will speak on "Electronics in the Electrical Industry."

Crude Rubber Future

SPEAKING before the final business meeting of the year of The Los Angeles Rubber Group, Inc., on November 12 at the Mayfair Hotel, Los Angeles, Calif., Paul S. Shoaf, of the Goodyear Tire & Rubber Co., forecast that natural rubber prices would stabilize at 12 to 15¢ a pound by 1948. Recently returned from a survey in the Far East of war damage to the rubber plantations, particularly in Java, Sumatra, and Malaya, Mr. Shoaf spoke on "The East Indies Situation."

The plantations have not been too badly hurt by neglect during the war years, the speaker stated, and poor transport and lack of machinery are hampering production more than the condition of the plantations. He expressed the belief that the Far East, with the exception of Java and Sumatra, would be shipping about 60% of its prewar quotas by the end of this year and would be able to supply the United States with some 600,000 tons of natural rubber in 1947. Because of internal strife, scarcely any rubber is coming from Java or Sumatra, or may be expected within the immediate future. The only rubber now being shipped from

these two countries is a mere trickle being smuggled out by Chinese middlemen. Conditions in these countries are still so chaotic that even an accurate survey of the plantations there is still impossible, he explained. Before production can be reestablished there, a solution of the political problems must be worked out, production of consumer items resumed, and the currency stabilized. Mr. Shoaf declared that, once conditions return to normal, labor costs will probably be doubled and rise to about 134¢ a pound. On this increased labor cost factor and on the balancing effect of synthetic rubber production, he based his prediction of 12 to 15¢ natural rubber in 1948.

In a predinner technical meeting, Raymond B. Stringfield, former Goodyear chief chemist, delivered a paper on "Costing Rubber Compounds." Dr. Stringfield advised caution on new types of business because of difficulties in proper pricing of the items.

"Don't set up for high-multiple mold work until the product has been thoroughly tested," he stated. "More likely than not, the customer will order changes in size or shape, and your price formula will be shot."

Members of the group have unanimously elected officers for the coming year. The new officers, to be installed December 3, are: chairman, Curtis R. Wolter, United States Rubber Co.; associate chairman, Phil Drew, Goodyear; vice-chairman, Charles Churchill, B. E. Dougherty Co.; secretary, Maurice Chisholm, Kirkhill Rubber Co.; and treasurer, Jack Ballagh, Patterson-Ballagh Corp.

The annual Christmas party of the Group will be held on December 3, at the El Capitan Theatre, where the Group will see Ken Murray's "Backouts."

Packaging Meeting

THE eighth annual meeting of the Packaging Institute was held at the Stevens Hotel, Chicago, Ill., November 25-26, with about 1,000 delegates from various industries attending. According to Program Chairman Mason Rogers of Dewey & Almy Chemical Co., the meeting consisted of two general sessions devoted to subjects of broad interest, followed by seminars discussing packaging problems by specific industries. The Institute's annual business meeting, including election of officers and directors, was scheduled for November 25.

In the first general session a paper, "What Is the Capitalistic System and What Part Does Distribution and Selling Play in It?", was given by Raymond Bill, chairman of the board and treasurer of Bill Brothers Publishing Corp., New York, publisher of *INDIA RUBBER WORLD*. In the seminar on food packaging, Francis W. Lanigan, of Dewey & Almy, spoke on "High Speed Packaging of Fresh and Frozen Foods." The textiles packaging seminar included a paper on "The Acetate Gift Package and Its Future in Textiles," by R. E. Evans, of Monsanto Chemical Co.'s plastics division, Springfield, Mass. H. J. Saladin, Standard Oil Co. of Indiana, Chicago, Ill., presided over the seminar on packaging of chemicals, petroleum, and allied products, and A. F. Wendler, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., presided over the organization meeting of the Institute's committee on standards and practices.



A. R. Hromatka

Paul S. Shoaf (Left) with Retiring Chairman C. M. Reinke at the November 12 Meeting of the Los Angeles Rubber Group

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Chicago Group Programs

THE Chicago Rubber Group held a dinner-meeting on November 1 at the Morrison Hotel, Chicago, Ill. Guest speakers were J. L. Brady, of the research division, Naugatuck Chemical division of United States Rubber Co., who discussed "Present and Future Synthetic Polymers and Their Place in Industry," and H. A. Winkelmann, director of research, Dryden Rubber Co., whose topic was "History of the Rubber Industry in Chicago."

Mr. Brady classified the various GR-S polymers under seven types and described the reasons for each classification and the various advantages, disadvantages, and special properties of each polymer in each group. Variations in viscosity were given as the first classification. The use of GR-S more plastic than the standard grade in certain adhesives and sponge rubber products were explained, as was the use of a very hard synthetic. Special polymers having greater tackiness than regular GR-S were in the second group. Of this group, mention was made of the use of GR-S-10 for tires, soles and heels, and belting. In the third group, where non-discoloration or non-staining is essential, special polymers such as GR-S-25 and GR-S-40 must be used. The former is used in general compounding where a very pale color is desired, and the latter is used for soles, heels, and wire insulation. An outstanding development in this group is X-317-AC, especially adapted to chemically blown sponge rubber products because of its very pale color, low viscosity (45 Mooney), lesser discoloration in light, and lesser staining of paper and cloth.

The fourth classification is those of special polymers possessing better processing properties than standard GR-S. GR-S-X-285 was described as differing from GR-S in that it contained 0.5% of a cross-linking agent. When used as only part of the total polymer, it markedly reduces the amount of shrinkage after milling, and the swelling of extruded material. GR-S-X-344 is the non-discoloring type similar to GR-S-X-285. The fifth group is specially prepared to have a very low water absorption value for use in products such as wire insulation. To obtain this property, the polymer is coagulated without salt or with alum alone. Masterbatches of carbon black and GR-S were described by Mr. Brady as being the sixth group. He presented data demonstrating that such masterbatches offer considerable advantages in cost and quality over GR-S mixed with black by regular methods. GR-S latices form the seventh group, and the speaker described some of the new types. Of particular interest are the high solids latices which are made without concentrating equipment and are therefore considerably lower in cost than standard latex.

Dr. Winkelmann's paper was identical to the one he presented before the History of Chemistry Division, A.C.S., at the recent meeting in Chicago. He gave a general review of the rubber industry in Chicago, résumés of interesting developments made by Chicagoans, and a survey of patents assigned to Chicagoans. The speaker then gave a review of the history and development of different types of rubber manufactures in the Chicago area, mentioning many companies and personalities. Products covered in this review included rubber clothing, mechanical goods, bicycle and automobile pneumatic tires, solid tires, carriage tires, reclaimed rubber, rubber horseshoe pads and rubber-

filled horseshoes, automobile tires, stamp gums, printers' rolls, oil seals, rubber cements, rubber and adhesive tapes, sponge rubber, hard rubber, and wire insulation.

The Group will hold its annual Christmas Party on December 20 in the Terrace Casino of the Morrison Hotel. A console radio-phonograph combination will be given away as a special feature of this year's party. In addition each lady will be presented with a special gift as a compliment of the Group. Tickets for the party are available from J. Frank Taylor, committee chairman, at the Commercial Solvents Corp., 1817 W. Fullerton St., Chicago. The committee in charge has engaged some of Chicago's best nightclub entertainment for the floor show, after which there will be dancing on the stage of the Casino.

Boss and White Speak before Connecticut Group

THE Connecticut Rubber Group held a meeting on November 8 in the United Illuminating Co. auditorium, New Haven, with some 87 members and guests attending. Guest speakers were A. E. Boss, manager of pigment sales for Columbia Chemical division, Pittsburgh Plate Glass Co.; L. M. White, research and technical development department, United States Rubber Co.; and Harry E. Outcault, vice chairman of the Division of Rubber Chemistry, A.C.S.

Dr. Boss spoke on "Experimental GR-S Polymers," using slides as illustrations. Synthetics, in general, said the speaker, offer the advantage that within limits they can be tailor-made to suit the consumer's requirements. Variations can be made in the monomer ratio of GR-S to produce a whole series of polymers showing differences in thermoplasticity, freezing point, and some other physical properties. Some properties can also be changed by use of different monomers, dispersing agents, and different degrees of conversion of the monomer to the polymer form. New stabilizing agents have made possible the production of light-colored and non-staining goods; while new means of coagulation have produced polymers with extremely low water-absorption properties. In addition masterbatches can now be made of difficultly dispersible pigments. The various latices now being produced offer a good range of average particle size and of total solids content. From the many GR-S types either already or potentially available, the compounder may now select polymers especially suited to particular end-products.

"Laboratory Evaluation of GR-S Processing Characteristics" was the title of the paper given by Dr. White, and was based on a paper published in the August, 1945, issue of *Industrial and Engineering Chemistry*. Dr. White recommended the following laboratory tests to provide a comprehensive evaluation of an elastomer in the average process: viscosity-temperature relation for raw elastomer from 100 to 300° F., using Mooney, Williams, or other viscosity measurements; rate of breakdown at mixing temperatures; viscosity increase on adding filler; viscosity-temperature relation for the compound, to determine effect of softener or filler which may be thermoplastic; scorch time at highest processing temperature; calen-

der shrinkage or tuber swell at preforming temperatures; roughness of calendared or tubed pieces; tubing speed; and tack.

Although not previously scheduled, Mr. Outcault took the opportunity to acquaint the Group with some of the plans of the Rubber Division.

At the business meeting preceding the technical session, presided over by the Group's chairman, William J. O'Brien, Jr., Edmund J. Butler presented his treasurer's report, and Raymond H. Dudley, Group vice chairman and chairman of the activities committee, discussed plans for future meetings. The next meeting of the group is tentatively scheduled for February 14, 1947, with the meeting place and speakers to be announced at a later date.

Standards Association Meeting

THE American Standards Association, 70 E. 45th St., New York 17, N. Y., held its twenty-eighth annual meeting on November 21 and 22 at the Waldorf-Astoria Hotel, New York. The Association is a federation of 88 national technical, trade, and governmental organizations, maintained by industry to promote the development and use of standards and to serve as the national clearing house for standards. It was started in 1918 as a result of production problems of the last war. The more than 800 standards approved to date by the Association represent in each case general agreement on the part of maker, seller, and user groups as to the best current industrial practice. Manufacturers, consumers, technical, and governmental agencies are represented on the committees which set up standards.

In addition to the program of committee, council, and directors meeting, a luncheon session was held on November 21, with some 400 members and guests attending. A welcoming address was given by Henry B. Bryans, president of the Association and executive vice president of Philadelphia Electric Co. He announced the attendance the largest in the Association's history and also that the basic membership had greatly increased during the year and now comprises 58 member-bodies, 38 associate members, and about 2,000 company members, with additional applications under review. Mr. Bryans reviewed the services offered by the Association and discussed progress to date in reconverting war emergency standards to peacetime status.

Other speakers at the luncheon session included Cyril Ainsworth, assistant secretary and technical director of ASA, who spoke on a "Review of the Standards Council," giving a detailed review of standards work currently under way. Mrs. Guy Moffett, member of the ASA board of directors, discussed "What the Consumer Wants in Standardization." "Industry's Stake in Standardization" was the subject of a paper by Howard Coonley, chairman of ASA's executive committee; and the concluding address on "Standards and Free Enterprise" was given by Ephraim Freedman, member of the Association's policy committee on standards and director of R. H. Macy & Co.'s Bureau of Standards.

The two-day meeting concluded with the Association's annual dinner on November 22. Principal speakers at the dinner were Lt. Gen. Ira C. Eaker, deputy

commander of the Army Air Forces, whose topic was "Two Wars—The Last and the Next," and V. K. Wellington Koo, ambassador from China, whose subject was "The Industrial Future of China."

During the meeting it was announced that Mr. Coonley has been elected president of the new International Organization for Standardization, the formation of which was recently completed by delegates from 25 nations meeting in London, England. Gustave L. Gerard, staff president of the Belgian Standards Association, will be vice president of the new organization, expected to be known informally as the ISO. Headquarters will be set up shortly in Geneva, Switzerland. The new organization consolidates the work of the old International Federation of National Standardizing Associations and the war-born United Nations Standards Coordinating Committee. The International Electrochemical Commission is expected to affiliate with the ISO shortly as its electrical division. The 25 nations represented in ISO are Australia, Austria, Belgium, Brazil, Canada, China, Czechoslovakia, Denmark, Finland, France, Italy, India, Mexico, Netherlands, New Zealand, Norway, Palestine, Poland, South Africa, Sweden, Switzerland, United Kingdom, the United States, the U. S. S. R., Yugoslavia. The governing body will be a council containing representatives from 11 countries. Five of these seats are assigned for a period of five years to China, France, Great Britain, the United States, and the Soviet Republic.

Cellulose Gum

HERCULES POWDER CO., Wilmington, Del., has announced the commercial production of CMC, a new cellulose derivative. This water-soluble cellulose gum has such a unique combination of properties that in a short time it has found application in a wide variety of industries, including textile, rubber, paper, paint, ceramics, cosmetics and printing. The gum, it is claimed, possesses many properties of water-soluble starches, gelatins, and gums, as well as the additional qualities found in processed or synthesized hydrophilic colloids.

CMC is the sodium salt of carboxymethylcellulose and is available in three viscosity grades: low, 25-50 cps. at 2% concentration; medium, 400-600 cps. at 2% concentration; and high, approximately 2,000 cps. at 1% concentration. Although water soluble, it can be made relatively water insoluble. It is adhesive, but not sticky, is insoluble in organic solvents, forms tough films, and not only acts as an emulsifying agent in oil-in-water emulsions, but also protects the emulsion. CMC greatly increases the viscosity of water and permits ready viscosity control of any solution in which it is used. It is relatively non-hydroscopic both in solution and film, is compatible with many water-soluble materials such as gums, plasticizers, and resins, and presents no fire hazard as it chars only at temperatures above 235° C.

The gum is used in textile manufacture in sizes and finishes as well as for printing pastes. It can also be used in ointment bases, in the thickening of rubber latex, in can-sealing compounds, and for paper and paperboard greaseproof coat-

ings. As an emulsion stabilizing or suspending agent, it is useful in lotions and other cosmetics, tooth pastes, and many types of oil-in-water emulsions. Its stabilizing and film-forming properties, according to the manufacturer, make it ideal for use in emulsion paints and lacquers where it also aids pigment dispersion. It can give adhesive or binding properties and is therefore used in leather pasting, preparing ceramic glazes, and for binding crayons and lead pencils.

Although known to Europeans for many years as sodium cellulose glycolate, little of it has been made in the United States until recently. Hercules began extensive tests and pilot-plant manufacture in 1944. The construction of a large, full-scale plant in Hopewell, Va., for the commercial manufacture of CMC was only recently completed.

Carlton Addresses California Group

THE last technical meeting of the year of the Northern California Rubber Group was held on November 21, at Angelo's Restaurant in Oakland, Calif., with 50 members and guests in attendance. The speaker of the evening was C. A. Carlton, of J. M. Huber, Inc., New York, N. Y., who spoke extemporaneously on several phases of rubber compounding, with special reference to the blending of natural rubber with GR-S. The accompanying photograph taken at the Group meeting shows from left to right: F. M. McMillan, Shell Development Corp., Emeryville, Calif.; Gene Foubert, Plant Rubber & Asbestos Works, San Francisco, Calif.; V. V. Wheeler, General Tire & Rubber Co., Akron, O.; and Mr. Carlton.

He first stated that he felt that a great deal more work should be done to determine what changes may take place in the composition of organic accelerators when they are incorporated in stocks at high milling temperatures. He expressed the belief that most accelerators lose much of their value when incorporated into a rubber stock at 250° F. or higher. With regard to the blending of natural rubber with GR-S, Mr. Carlton said that he thinks it is the duty of compounders to find ways of making good stocks out of such blends. With natural rubber becoming increasingly plentiful, there may be a tendency to avoid the use of GR-S to such an extent that it would be difficult to keep the GR-S plants in operation, and a possibility of the continued development of such a trend might be to return the



Commercial Studios

Some Members and the Speaker at Northern California Group Meeting

United States to the condition of unpreparedness in rubber that existed before Pearl Harbor.

It was pointed out that in many cases the maximum physical properties of blends of natural rubber and GR-S are not being obtained because of lack of knowledge of the best compounding techniques. For example, when a natural rubber stock having a tensile strength of 3,000 p.s.i. is blended with a GR-S stock having a tensile strength of 2,000 p.s.i., the resulting blend seldom has a tensile value of more than 2,100 or 2,200 p.s.i. Such a blend should have a tensile strength of 2,500 p.s.i. To increase the effectiveness of natural rubber when blended with GR-S, the speaker said that he felt that more attention should be given to the matter of the solubility of accelerators. Blends in which the natural rubber is overcured and the GR-S fully cured, or where the natural rubber is fully cured and the GR-S undercured, are obviously not to be desired. Mr. Carlton stated that with regular GR-S and natural rubber blends, in stocks compounded without carbon black or other pigmentation to complicate the results, it was possible to come to within 97% of the optimum tensile strength by paying particular attention to the solubility of accelerators in the two rubbers.

After an extensive question and answer period following Mr. Carlton's talk, the Westinghouse sound film, "Electronics at Work," was shown. This film explains the various functions of the electronic tube and its practical application in industry.

Two door prizes donated by the Pioneer Rubber Mills, Pittsburg, Calif., were won by Tom Snedden, Pacific Rubber & Tire Mfg. Co., and E. C. McLaughlin, H. M. Royal, Inc., of Los Angeles.

R. I. Group Elections

THE annual election of officers of the Rhode Island Rubber Club took place at a dinner-meeting on November 14 at the Crown Hotel, Providence, with some 65 members attending. The Group's officers for the coming year are: president, H. W. Greenup; secretary, Howard Fulton; and executive committee, S. I. Strickhouser, S. J. Lake, D. C. Scott, Jr., F. S. Bartlett, M. J. Linn, C. F. Hoover, F. H. Springer, L. T. Wilson, and H. E. Murch. F. H. Springer was originally elected president at the dinner-meeting, but resigned the office at a special meeting of the group's executive committee on November 19. The committee unanimously voted to fill the position with H. W. Greenup, who had received the next greatest number of votes; his place on the new executive committee has now been taken by Mr. Springer.

Besides elections the Group also heard the treasurer's report. Guest speaker at the dinner was Maj. Lex King Souter, of the Army Air Combat Intelligence Reserve, who gave an inspiring and thought-provoking talk on the international situation. The speaker drew copiously on his extensive war experiences to point up many of the remarks in his talk. In addition, dinner entertainment was provided by the Kenmore Quartet.

Plastics Technology

Plastic Bonds Resistant to Temperature Changes

SATISFACTORY bonding between a plastic and a metal facing or metal reinforcement has been practically impossible in the past, primarily because the two types of materials differ in their coefficients of expansion. Plastics have relatively high coefficients of expansion, in contrast to metals, and changes in temperature create forces that prevent satisfactory bonds. Investigations at the National Bureau of Standards by P. S. Turner, of the Plastics Section, have shown that the coefficients of thermal expansion of components can be matched, giving a bond between the components resistant to temperature changes.

Two Types of Bonds

Bonds produced by adhesives fall into two classes: the rubbery or yielding bond and the rigid bond. The first category includes most thermoplastic cements, rubber cements, and combinations of thin rubber layers and cements. These adhesives provide durable bonds between dissimilar materials at moderate temperatures. The rigid bond has generally proved unsatisfactory for such applications with the possible exception of cold-setting cements of phenol-formaldehyde and urea-formaldehyde types. At reduced temperatures, however, the yielding adhesives lose their ability to eliminate stress concentrations by yielding with the dimensional changes of the materials bonded. If it can be obtained, the rigid bond is superior for many purposes because it produces a stronger and less-yielding product. For composite structural material subjected to extreme

temperature changes, a stable rigid bond is imperative. The solution lies in the matching of thermal-expansion coefficients of the components.

Formula for Thermal Expansion Coefficient

The formula developed by P. S. Turner indicates that the resulting volume thermal coefficient of a mixture

$$\beta_r = \frac{\beta_1 P_1 K_1}{P_1 K_1 + P_2 K_2 + \dots + P_n K_n} + \frac{\beta_2 P_2 K_2}{P_1 K_1 + P_2 K_2 + \dots + P_n K_n} + \dots + \frac{\beta_n P_n K_n}{P_1 K_1 + P_2 K_2 + \dots + P_n K_n}$$

where β is the coefficient of cubical thermal expansion; K is the bulk modulus; P is the fraction or per cent by weight; d is the density; and the numerical subscripts refer to the particular constituents, while r refers to the resultant mixture. Since the coefficient of linear expansion is directly proportional to the cubical coefficient, a substitution of the former in the above equation is possible. Moreover, for a mixture whose components have nearly equal values of Poisson's ration, Young's moduli may be used in place of the bulk moduli.

Applications of the Formula

The formula has been used successfully in a number of applications. A mixture of polystyrene and aluminum oxide, for example, was determined in this fashion

so that brass inserts were feasible. Brass inserts in ordinary polystyrene cause the polystyrene to crack as a result of the differences in thermal-expansion coefficients. The coefficient of linear expansion of polystyrene is approximately 70×10^{-6} per degree Centigrade; while that of brass is about 17×10^{-6} . Fused aluminum oxide was chosen for use in the mixture because it has a low coefficient of linear thermal expansion— 8.7×10^{-6} —and a high modulus of elasticity compared to its density. Its choice for use with polystyrene was also determined by its desirable electrical properties, and there was no appreciable change in the electrical resistance of polystyrene on addition of the filler.

Calculations revealed that approximately 90% of polystyrene and 10% of aluminum oxide would be required to match the coefficient of linear thermal expansion of brass. Analysis with polarized light indicates that there are stresses in the pure polystyrene concentrated at the boundaries between the brass and polystyrene, and these are sufficient to rupture the polystyrene. With about 10% of fused aluminum oxide filler, such stress concentrations are absent, and there is no evidence that the filled styrene has fractured. The brass was sufficiently well bonded to the polystyrene to permit sawing and machining of the composite material.

Rivet fillers for aluminum, used to cover the depressions caused by riveting, have also been developed by this method as well as a mixture of glass fiber and phenolic resin designed to match aluminum alloy metal reinforcing plates. The technique permits the formulation of pigmented protective coatings that have satisfactory adhesion to the coated material. In general the method provides information leading to the proper combination of materials for a matching of thermal coefficients, which in turn yields stable bonds even between large sections and over extreme temperature changes.

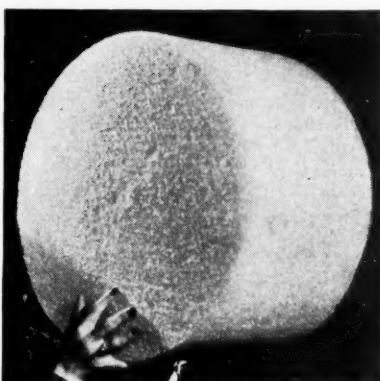
New Insulation and Buoyancy Materials

STYROFOAM a newcomer in the field of low-temperature insulating materials, was recently announced by Donald L. Gibb, manager of the plastics sales division, Dow Chemical Co., Midland, Mich. Styrofoam is Styron expanded 42 times its size. This expansion produces a multicellular mass of foamlike material claimed to have low thermal conductivity, good structural strength, and, what is very important in low-temperature insulation, outstanding ability to resist moisture and water. Styrofoam is said to be the lightest of all known insulation materials in solid form.

Typical properties of this new material are: density, 1.3-2.0; tensile strength, 100 p.s.i.; compression strength, 35 p.s.i.; compression modulus, 1000 p.s.i.; bending modulus, 1,900 p.s.i.; impact strength, 3.8 in. lbs.; thermal conductivity, 0.27 BTU/hr./sq. ft./° F./in.; and buoyancy after one-week immersion, 59.5 lbs./cu. ft. Other advantages offered of importance in refrigeration installations are ease of assembly, good resistance to mold and rot, resistance to atmospheric exposure, no loss of strength at low temperatures, and no tendency to disintegrate or settle.

It has a slow burning rate and, in tests, withstood .50-cal. incendiary bullets without continuing to burn.

Even at its present development price,



Dow Styrofoam. More Than Six Times Lighter Than Cork

Styrofoam competes readily with other established types of refrigeration insulation. It will be produced in slabs of standard dimensions as requirements dictate. Mr. Gibb added that plans are now under way to increase manufacturing facilities for Styrofoam, although indications are that demand will far exceed production for some time to come.

Hysteresis Reprints Available

At the request of certain of our readers we are preparing reprints of the article, "Hysteresis and Methods for Its Measurement in Rubber-Like Materials," by J. H. Dillon and S. D. Gehman, which appeared in our October and November issues.

Those interested may secure copies of this pamphlet at 50¢ apiece by writing direct to India RUBBER WORLD, 386 Fourth Ave., New York 16, N. Y., and we will send the reprints as long as the supply, which is limited, lasts.

RUBBER WORLD

NEWS of the MONTH

Highlights—

Trading in rubber futures was resumed on the London market on November 18, but the United States seems likely to continue its program of government purchasing until at least April, 1947. The CPA Rubber Division increased the amount of natural rubber available for use in rubber products in two actions during November. The International Rubber Study Group met in Holland on November 25 and in a communique released following the one-week meeting expressed optimism with regard to natural rubber production during the coming months. Continued government control of the production of rubber goods

and the allocation of natural rubber in the United States beyond April, 1947, is considered possible in view of the unstable supply and price picture for natural rubber and lack of policy on the disposal of synthetic rubber plants. New estimates of production and consumption of both natural and synthetic rubbers for 1947 and 1948 have been made public. The URWA has asked the big Four companies to reopen the contract of March 2, 1946, in view of the increased cost of living so that new wage increase may be granted. The companies have agreed to discuss the question of whether the contract permits such a discussion, at a meeting with the union in Philadelphia on December 6.

Action and Reaction in Rubber

Happenings in the news on a broad international and national front during November presented such a multitude of items recording the actions and reactions of various governments and divisions of government and industry, and all had such a bearing on the future of the rubber industry that it has been necessary to divide these items as nearly as possible on an international and national basis. The agreement of October 1 between the United States and the United Kingdom to purchase an additional 200,000 tons of rubber during the last quarter of 1946 at 20½¢ a pound resulted in the development of a situation whereby about 50,000 tons of this amount will probably have to be supplied from stocks in the United Kingdom, originally purchased from Malaya at 23½¢ a pound. Trading in rubber futures on a free market basis was resumed in London on November 18. Pieter Honig, of the Netherlands Government, on November 18 called for the establishment of a new international rubber control plan as the "only solution of the problem of potential overproduction." The International Rubber Study Group held another meeting at the Hague.

The CPA Rubber Division increased further the amount of natural rubber permitted for use in tires and other rubber products in two actions, one on October 30 and the other on November 15. Additional details of the October 18 meeting of the CPA Industry Advisory Committee throw more light on industry and government attitudes on natural and synthetic rubber use and future prospects. More reports on rubber consumption and tire and tube production have become available from the CPA and the RMA. Harvey Firestone, Jr., in a talk before the National Industrial Conference Board in New York on November 19 called the three factors: how good a job management and labor can do in producing goods efficiently, how successful industry is in developing new and better products, and how successful industry is in marketing them aggressively at low prices, as the keys to avoiding any business recession in 1947.

International Developments

It was reported from Singapore on

October 29 that it was reasonably certain that Malaya would be unable to supply the full 200,000 tons of natural rubber that the United States has agreed to purchase from the United Kingdom at 20½¢ a pound before January, 1947, in accordance with the contract of October 1. The Singapore rubber trade has estimated that the probable shortage of the supply of Malayan rubber will be from 50,000 to 60,000 tons. Other foreign buyers have bought fairly large amounts of rubber in Malaya since the October 1 agreement, and it is understood that these purchases were at higher prices than 20½¢ a pound. The deficit in the Malayan supply will have to be made up from stocks in Great Britain, which have been purchased at the equivalent of about 3¢ a pound above the price the United States will pay.

A report from Singapore, on November 29, however, stated that if production equaled 40,000 tons a month through December, Malaya could supply the 200,000 tons the United States had agreed to buy by January 1, with 40,000 tons to spare. The Registrar of Statistics of the Malayan Union reported on November 29 that Malaya's October rubber production totaled 47,203 tons, compared with 43,222 tons in September.

H. P. Marquand, secretary of Britain's Board of Trade, overseas department, announced in the House of Commons on November 4 that Britain would restore private trading in rubber and permit imports on private account to begin about January 1, and that the Board of Trade would then cease to purchase rubber.

"Supplies in the Far East have exceeded all expectations, and in particular it is encouraging to observe the rapid recovery of Malayan rubber despite many years of Japanese occupation," Mr. Marquand explained. "There have been discussions between appropriate departments and the Rubber Trade Association in London so as to allow the effective functioning of the markets under conditions of exchange control, and to limit so far as possible undesirable speculative financial transactions under cover of the market."

Mr. Marquand also disclosed that the British Government had 138,958 tons of

natural rubber, including latex, and 2,485 tons of synthetic rubber on hand as of September 30. Any imports of synthetic rubber which might become necessary would be allowed on private accounts, when trading resumes, he said.

With the resumption in trading in rubber futures on November 18, a report from London stated that offers were made for April-June delivery at 23½¢ a pound and for July-September delivery at 22¾¢ a pound, but there were no takers at these prices.

Pieter Honig, deputy director of the Netherlands Indies Government Department of Economic Affairs, was reported from Amsterdam, on November 18, as advocating the establishment of a new international rubber control plan which will permit working out an arrangement between producers of natural and synthetic rubber as the "only solution of the problem of potential overproduction." Definite action at the November 25 meeting of the Rubber Study Group was necessary, he stated, because since the last session of the group the Far East had again entered the productive stage and was giving indications of recapturing its former predominant position.

The agreement of the Dutch and Indonesian negotiators in Netherlands India upon the autonomy of the N. E. I. is an encouraging development not only from the political angle, but from the angle of increasing the shipments of rubber from this area. The agreement offers the people of Indonesia the basic rights they have been demanding and at the same time permits the continuation of close ties between the people of the Netherlands and the people of Indonesia upon the basis of full equality. The agreement further provides for the establishment within the next two years of a United States of Indonesia comprising the newly created republic together with an autonomous state of Borneo and an autonomous state of the Great East, the latter to include such territories as Bali, Dutch New Guinea, the Celebes, and the Moluccas. The agreement requires the final approval of the Netherlands Governments, which seems certain to be granted. Another clash between Indonesian and Dutch troops, however, was reported during the latter part of November, in Java.

The third meeting of the International Rubber Study Group, made up of representatives of the Netherlands, the United States, Great Britain, and France, began in Holland on November 25 and ended the 28th. The chief objective was to evaluate the effect on rubber prices of the reopening of the free market in London and eventually in New York. The United States, bulk purchaser of natural rubber, is expected to cease all operations on a government basis in rubber by February, according to one report. The Rubber Study Group will make a further study of the world supply-demand position in rubber, the relation of natural to synthetic rubber, and will also decide regarding the admission of new members. A request for membership has been received from Canada and Brazil.

The United States delegation is headed by Donald D. Kennedy, chief of the international resources division, Department of State, with William T. Phillips, special assistant to the chief, international resources division, as alternate. Listed as advisers are: H. C. Bugbee, attache of the U. S. Embassy at London; W. L. Batt, chairman of the Inter-Agency Policy Committee on Rubber; George M. Tisdale, chairman of the Combined Rub-

ber Committee; Everett G. Holt, rubber adviser, U. S. Department of Commerce; A. L. Grant, president of the Rubber Development Corp., RFC; A. L. Viles, president of The Rubber Manufacturers Association, Inc.; P. W. Litchfield, chairman of the board, Goodyear Tire & Rubber Co.; and John L. Collyer, president, The B. F. Goodrich Co.

A communique from the Study Group meeting was issued by the London Board of Trade on November 29, in which it was stated that the 1946 production of rubber, both natural and synthetic, will be 100,000 tons greater than needs and forecast a widening margin of production which may cause "disequilibrium" in rubber markets. This consumption estimate allowed no margin for stockpiling, which would absorb much, if not all of the 100,000 tons' excess production. In another report on this communique it was stated that for at least two years synthetic rubber production in the United States will be a necessary factor in making overall world production meet estimated demand.

Figures released by the Study Group on natural and synthetic rubber production and consumption through 1948, assumed relatively stable political conditions in the Far East, particularly Indonesia, and a high level of economic activity in western industrial powers. Total world production for 1946 is estimated at 1,800,000 tons, of which 860,000 are natural rubber. For 1947, natural rubber was estimated at 1,200,000 tons and for 1948, 1,500,000 tons. World consumption, without taking into account stockpiles in natural and synthetic rubber, amounts to an estimated 1,500,000 tons for 1946; 1,700,000 for 1947, and 1,675,000 for 1948.

Optimism prevailed with regard to natural rubber production in the coming months. Netherlands' spokesmen mentioned 350,000 tons for export from Indonesia in 1947, owing to allowance having been made for the "condition we may expect in the different islands." Borneo, Sumatra, and Java are now producing at a rate of 22,000 tons a month, it was reported.

Delegates were in agreement that the cost price of natural rubber will be very hard to calculate for the next two years or until a rice surplus can be found again in rubber producing regions. Presently rice is running from five to ten times and even more than the prewar price, and this situation has a direct bearing on rubber costs. Rice quotations in turn reflect the political state of the area concerned, and as long as unrest exists, there can be little hope for stability in rice or rubber.

The Group approved a tentative plan for its fourth meeting, to be held in Paris early next summer, with final decision as to time and place to be settled in the meantime by member governments. Then it is expected a much broader representation will attend.

Developments in U. S. A.

As indicated last month, the Rubber Division of the CPA took steps to increase the amount of natural rubber permitted for use in the manufacture of tires and other rubber products during November. The first action, in fact, took place on October 30, when the percentage of natural rubber which may be used in making small and medium-size passenger tires was increased from 13 to 23%. Increases were made proportionally in other sizes, with tires of 11-inch cross-section and larger being granted as much

natural rubber as the individual manufacturers wishes to consume.

Then on November 15 the CPA permitted 36 additional types of products to be made with some natural rubber, increased the amount of natural rubber which may be used in 28 others, and in 121 other items permitted manufacturers to use as high a percentage of GR-1 (Butyl) as they wish. The full details of these actions will be found on page 389. The November 15 action consisted of a reissue of Rubber Order R-1, and the CPA stated that no further changes in R-1 affecting the consumption of natural rubber are contemplated for the balance of 1946.

Of course, following the results of the national election on November 5 and the virtual abolishment of most of the powers of the OPA, the rubber industry was relieved of all controls from that government agency. However the CPA seems likely to continue in force until at least April, 1947, and there seems to be considerable support in industry circles for continued control of the rubber industry through R-1 until that time.

The CPA Rubber Division on November 7, announced that the restriction against selling a spare tire with a new passenger car would remain in force because of the continued shortage of tires. This decision was based on a study by CPA, completed during October, which revealed that passenger-car and small truck tire demand was greater on October 1 than on June 1. In the nationwide survey 65% of the replies indicated that demand for passenger-car tires was greater on October 1 than on June 1, 27% indicated demand unchanged, and 8% said that demand was less. However advice from Washington late in November was that this decision would be reversed within two or three weeks and that, effective about January, 1947, new automobiles would be sold equipped with a spare tire.

CPA Industry Advisory Committee Meeting

Some additional details of the October 18 meeting of the CPA Industry Advisory Committee reported on briefly last month, have become available. A report of a meeting of the Committee held on November 8 has also been received. The tentative 1947 rubber utilization, based on an estimated use of 1,002,777 long tons of both natural and synthetic rubbers, was given in detail together with a partial breakdown to show the division of usage between transportation and non-transportation items and the natural *versus* GR-S relation. This table is on page 387.

Natural rubber consumption shown in the table, designed to attain the objective of the Inter-Agency Policy Committee on Rubber for consumption of GR-S, results in "extra" rubber after meeting the needs of government and industry, it was pointed out. Under such conditions a situation of short supply would be difficult to substantiate as a basis for continued controls of rubber under R-1. Until Congress gives consideration to the IPRC proposals, however, CPA may have a responsibility for continuing its controls, it was said. Possible uses of the "extra" rubber including new uses in products not now being made with GR-S, the use of more natural rubber in non-transportation products, and the substitution of natural rubber for GR-1 to a greater extent in inner tubes, were suggested. These uses were incorporated in the November 15 reissue of R-1.

There was much discussion of whether

or not the public purchase program for natural rubber should be continued. Several committee members expressed the opinion that the public purchase program should be continued at least through the first quarter of 1947. Mr. Phillips urged that the program be terminated as soon as possible, since buyers' cartels are as undesirable as the producers' cartel which formerly existed. Mr. Grant urged that the public purchase program be terminated in the interest of an orderly transition from controlled to free importation while CPA is still in existence to assist in overcoming any complications that may arise. The end of the program would not mean the end of RDC operations, he pointed out; it would merely mean that RDC would no longer be the sole buyer of rubber for the United States. During the first quarter of 1947, therefore, private buyers could import rubber if they desired, or they could buy from the RDC at 22½¢.

Committee members pointed out that ample supplies of natural rubber do not exist to meet all needs. The easy supply situation is predicated on the use of synthetic rubber also. Unless controls are continued until the production of synthetic rubber is assured, the situation may change radically. Although the industry as a whole would certainly not try to obtain enough natural rubber to meet its total requirements, some companies might use a disproportionate share in their products and upset the attainment of the IPRC objective.

W. James Sears, director of CPA's Rubber Division, commented that the Rubber Division tends toward the opinion that the CPA has a responsibility for assuring the production of synthetic rubber by continued controls during the existence of the CPA. He felt that maintenance of the public purchase program might be justified in order to support the government's stabilization program. Return to private purchase at this time might upset the stabilization program and destroy the prospects for continued development and use of synthetic rubber, he feared.

Another meeting of the CPA Rubber Industry Advisory Committee was held in Washington on November 8 for the purpose of again discussing the problems involved in the future purchase of natural rubber. Following a meeting of the Committee on the next day, November 9, with the Director of the Office of War Mobilization and Reconversion, the following statement was issued by the Reconversion Director John R. Steelman.

The government will make no change in the near future in its program for public purchase and control of importation of natural rubber. This decision was made on the basis of strong recommendations by the rubber industry, Mr. Steelman said. At the meeting of the Rubber Industry Advisory Committee in his office, industry spokesmen stressed the necessity, in the interests of natural security, of continuing for the present the public procurement of rubber as an integral part of an overall program for insuring continuation of a United States synthetic rubber industry.

The entire question of public procurement and import controls of natural rubber will be under continued review by the government, in cooperation with industry, in the light of further developments in the rubber situation of this country, the Reconversion Director added.

Mr. Steelman said that controls on domestic uses of natural rubber must be continued beyond March 31, their present

expiration date. Termination of these controls before natural rubber supplies are adequate to meet unrestricted domestic requirements would be harmful to the reconversion program and might seriously jeopardize the national security, Mr. Steelman said.

The need of continuing controls over domestic consumption of natural rubber will be fully reported to Congress, Mr. Steelman added. He pointed out that even with significant increases in foreign supply, the amount of natural rubber available to the United States will fall far short of meeting demands of U. S. industry under conditions of unrestricted consumption. For this reason, and in the interests of maintaining an operating synthetic rubber industry for national security reasons, Congress will be asked to authorize continuation of rubber controls beyond March 31, Mr. Steelman said.

Returning again to the meeting of October 18, it was also stated that the need of the continued production and consumption of synthetic rubber was recognized as a matter of national importance over and above the protection afforded to industry through the availability of synthetics. As the level of consumption will depend largely upon the relative price of synthetic and natural rubber, it was suggested that everything possible be done to reduce the price of synthetics. A price of 15¢ a pound was considered desirable.

It would be impossible to reduce the price to 15¢ a pound, according to George Hebbard, deputy director, Office of Rubber Reserve. Everything possible is being done to increase the efficiency of synthetic production, however; the more expensive alcohol process is being eliminated, and more economical plants are being consolidated. Some degree of price reduction should be possible.

The Committee made the following recommendations, some of which were reported last month, but are repeated for the purpose of continuity: (1) that the public purchase program be continued for the first quarter of 1947 purchases; (2) that the production of synthetic rubber be continued to support the IPCR recommendations, assure national security, and at a sufficiently high level to eliminate GR-S allocation; (3) that a program of natural rubber allocation along the lines of the table given above be adopted January 1, 1947; (4) that steps be taken to effect a reduction in the price of synthetics; (5) that industry stocks be at a two-month position; (6) that R-1 be continued; (7) that specifications be changed the first of the year.

There was some dissent from the majority recommendations. Two members urged that R-1 be discontinued on January 1, 1947, at least on certain mechanical segments of the industry, if this policy can be adapted without creating inequities. These members favored the IPCR recommendations, however, and believed the two viewpoints compatible if total usage of synthetic, rather than individual item usage, is held at one-third of total consumption.

Another minority opinion was that public purchase should be eliminated on January 1, 1947, as a move toward orderly transition from controlled to free operation during the existence of CPA.

R. S. Wilson, of Goodyear, (CPA consultant) expressed the opinion that the discussion had brought into focus the problem of possible future controls. He inquired whether the committee considered any controls necessary after March 31, 1947, as a safeguard to the production

of synthetics and ultimately for national security.

Some committee members felt that controls may be necessary, or at least desirable, beyond March 31, 1947. Others believed that decontrol at that time may be possible without creating particular hazards. A committee member suggested that the Inter-Agency Committee, which has the responsibility for formulating ideas and suggestions concerning rubber, give the matter consideration and make recommendations to Congress in line with its findings.

Mr. Sears urged committee members to reexamine the situation on synthetics and submit any suggestions to Mr. Batt.

Rubber Industry Advisory Committee members present at one or both of these meetings were: Charles H. Baker, Charles H. Baker, Inc., Providence, R. I.; Earl Bunting, O'Sullivan Rubber Co., Inc., Winchester, Va.; Mr. Collyer, Harvey S. Firestone, Jr., The Firestone Tire & Rubber Co., Akron, O.; Robert Graham, alternate for William O'Neil, General Tire & Rubber Co., Akron, F. D. Hendrickson, American Hard Rubber Co., New York, N. Y.; Howard W. Jordan, Pennsylvania Rubber Co., Jeannette, Pa.; R. G. Landers, Landers Corp., Toledo, O.; Mr. Litchfield, Jean H. Nesbit, U. S. Rubber Reclaiming Co., Inc., New York; E. E. Neyland and H. P. Schrank, alternates for J. P. Seiberling, Seiberling Rubber Co., Akron; H. S. Royce, alternate for J. Newton Smith, Boston Woven Hose & Rubber Co., Boston, Mass.; B. R. Prall, alternate for A. L. Freedlander, Dayton Rubber Mfg. Co., Dayton, O.; George B. Dryden, and alternate, Oliver G. Vinneiges, Dryden Rubber Co., Chicago, Ill.; Mr. Tisdale, alternate for Herbert E. Smith, United States Rubber Co., New York; H. B. Urtel, alternate for Thomas Robbins, Jr., Hewitt Rubber, Buffalo, N. Y.; and James A. Walsh, Armstrong Rubber Co., West Haven, Conn.

WAA Rubber Plants and Facilities Branch

Establishment of a Rubber Plants and Facilities Branch to dispose of about 60 surplus plants producing raw materials, synthetic rubber, and end-products was announced last month by John J. O'Brien, Deputy Administrator for Real Property Disposal, War Assets Administration. The new branch headed by R. F. Dimmitt, will dispose of more than \$600,000,000 worth of rubber plants, most of which are still in operation under supervision of the Office of Rubber Reserve and have not yet been declared surplus.

In announcing establishment of the branch, WAA emphasized the importance of rubber to national defense. The Inter-Agency Policy Committee on Rubber, recommended to Congress and the President that rubber facilities be disposed of to private industry, but with safeguards to assure continued manufacture and use of synthetic rubber.

WAA said that all dispositions will be in accordance with the objectives of the Surplus Property Act which provides for wide distribution, encouragement of small business, and prevention of monopolistic activities. Another basic objective will be to transfer the plants from government to private ownership with little or no disruption of production and in a manner to serve the best interests of national economy.

The Rubber Plants and Facilities Branch will confer with and assist private industry in preliminary negotiations for plants and in determining degree of par-

ticipation in the synthetic rubber program.

Plants to be made available include those designed to manufacture butadiene, styrene, neoprene, Butyl, guayule, GR-S, tires, tubes, soles and heels, and other products.

It is understood that the IPCR hopes that operators will come and talk to the WAA before the policy on synthetic plant disposal is established. Something of an impasse has developed since the industry has exhibited a reluctance to make suggestions before the Inter-Agency Committee makes its policy known. As a result, the government agencies concerned may have to send men to the industry to get information to aid in formulating policy.

The problems of disposal of synthetic rubber plants, public purchase program of natural rubber, and the authority to allocate rubber supplies are so interconnected that no decision can be made on any one of these problems separately. It is understood that there is a growing feeling on the part of the military that the synthetic rubber plants are of greater importance than a stockpile of natural rubber. Also, despite opinions in certain quarters regarding the easily available money available to the rubber companies for the purchase of the synthetic rubber plants, the rubber industry and its financial backers are unable to take the "risk" of buying the government plants for private operation in the near future. Even if these plants could be purchased for about one-third of their original cost, the investment would be tremendous.

RMA Reports

The Rubber Manufacturers Association released figures during the latter part of November on the consumption of rubber during September and for the first nine months of 1946. The nation's rubber factories used 750,281 long tons of natural and manufactured rubber between January 1 and September 30, it was reported. September consumption was 89,812 tons and compared with 89,891 tons in August.

Translated in terms of a flood of more than 50,000 rubber products in consumer goods lines—one of which has been more than 58 million truck, bus, and passenger-car tires—this means reconversion is a matter of history so far as it pertains to the rubber manufacturing industry, the Association said.

A breakdown on use showed that the industry consumed 584,220 tons of manufactured rubber and 166,061 tons of natural rubber during the three quarters ended September 30, 1946. Apart from crude rubber, the industry used 200,739 tons of reclaim rubber in the nine month period. The detailed report is given on the next page.

The RMA also released its monthly report on tire production during November, giving figures for output during September. Passenger-car tire production increased in September to 5,869,047 units, a gain of 1.35% over the preceding month. At the same time truck and bus tire production rose 8%. September output brought production of passenger-car tires to 47,320,982 units for the first nine months of 1946. Production of 1,364,004 truck and bus tires in September raised the total for the year through September 30 to 11,391,013 units.

The report on page 387 covers only automotive pneumatic casings and inner tubes. It does not include figures on solid rubber tires or pneumatic tires for motorcycles, bicycles, farm, industrial, or aviation equipment.

ESTIMATED RUBBER CONSUMPTION BY DOMESTIC MANUFACTURERS
(Long Tons)
September-August, 1946, September, 1945—Nine Months Ended September 1946, 1945

	September, 1946				Nine Months Ended September			
	% Change from				% Change from			
	Sept., 1946	Aug., 1946	Sept., 1945	Aug., 1946	Sept., 1945	1946	Prev. Year	1945
Natural Rubber	31,133	+9.60	+436.87	28,405	5,799	166,061	+101.38	82,463
Manufactured Rubber								
GR-S Type	47,658			49,971	40,269	487,815		450,044
Neoprene	4,106			4,077	2,299	31,567		34,192
Butyl	6,264			6,796	2,581	60,556		31,099
GR-A (N Types)	651			642	330	4,282		7,239
TOTAL MANUFACTURED RUBBER	58,679	-4.57	+29.02	61,486	45,479	584,220	+11.80	522,574
TOTAL NATURAL AND MANUFACTURED RUBBER	89,812	-.09	+75.15	89,891	51,278	750,281	+24.01	605,037
Reclaim Rubber	23,732	-3.40	+36.67	24,566	17,365	200,739	+12.15	178,998

* Revised.

ESTIMATED AUTOMOTIVE PNEUMATIC CASINGS AND TUBE SHIPMENTS, PRODUCTION, AND INVENTORY—SEPTEMBER, AUGUST, 1946, FIRST NINE MONTHS, 1946, 1945

	Original Equipment	Replacement	Export	Total Shipments	% of Change from Preceding Month	Production during Month	% of Change from Preceding Month	Inventory End of Month	% of Change from Preceding Month
PASSENGER CASINGS									
September, 1946	1,188,161	4,397,694	39,777	5,625,632	+2.41	5,869,047	+1.35	2,586,035	+13.01
August, 1946	1,237,584	4,189,998	65,493	5,493,075		5,790,850		2,288,409	
1st 9 mos., 1946	7,075,282	38,945,720	429,164	46,450,166		47,320,982		2,586,035	
1945	371,201	16,110,426	146,149	16,627,776		17,049,233		1,323,303	
TRUCK AND BUS CASINGS									
September, 1946	448,169	810,371	58,438	1,316,978	-1.09	1,364,004	-8.00	784,347	+9.24
August, 1946	446,710	806,787	77,963	1,331,460		1,263,016		718,031	
1st 9 mos., 1946	2,844,205	7,917,259	584,167	11,345,631		11,391,012		784,347	
1945	4,150,073	8,876,559	182,623	13,209,255		13,228,729		718,454	
TOTAL AUTOMOTIVE CASINGS									
September, 1946	1,636,330	5,208,065	98,215	6,942,610	+1.73	7,233,051	+2.54	3,370,382	+12.11
August, 1946	1,684,294	4,996,785	143,456	6,824,535		7,053,866		3,006,440	
1st 9 mos., 1946	9,919,487	46,862,979	1,013,331	57,795,797		58,711,994		3,370,382	
1945	4,521,274	24,986,985	328,772	29,837,031		30,277,962		2,041,757	
PASSENGER TRUCK AND BUS TUBES									
September, 1946	1,640,506	4,998,203	96,083	6,734,792	-2.82	7,286,936	+3.62	4,434,596	+12.87
August, 1946	1,696,718	5,107,087	126,732	6,930,537		7,032,135		3,928,912	
1st 9 mos., 1946	10,029,882	41,027,980	955,162	52,004,024		53,661,278		4,434,596	
1945	4,531,329	23,981,882	264,413	28,777,624		29,345,263		2,731,550	

The Rubber Manufacturers Association, Inc.

ESTIMATED CONSUMPTION OF NATURAL AND SYNTHETIC RUBBERS, FOURTH QUARTER, 1946, 1947 AND 1948

	NATURAL		SYNTHETIC (Long Tons)					TOTAL NATURAL PLUS SYNTHETIC		% GR-S of Total GR-S and Natural
	Long Tons	%	GR-S	Butyl	Neo-prene	N Type	Total	Long Tons	% Natural	
4th Quarter										
Transportation	86,315	80	108,500	20,125	.....	.....	128,625	214,940	40.16	55.69
Other	21,585	20	39,600	275	14,600	1,800	56,275	77,860	27.72	64.72
Total	107,900	100	148,100	20,400	14,600	1,800	184,900	292,800	36.85	57.85
1947										
1st Quarter										
Transportation	98,279	75	76,819	17,990	.....	.....	94,809	193,088	50.90	43.87
Other	32,760	25	17,503	298	12,000	1,800	31,601	64,361	50.90	34.82
Total	131,039	100	94,322	18,288	12,000	1,800	126,410	257,449	50.90	41.85
2nd Quarter										
Transportation	98,054	75	77,650	18,048	.....	.....	95,698	193,752	50.61	44.19
Other	32,685	25	17,754	340	12,000	1,800	31,894	64,579	50.61	35.20
Total	130,739	100	95,404	18,388	12,000	1,800	127,592	258,331	50.61	42.19
3rd Quarter										
Transportation	88,925	72	70,868	16,465	.....	.....	87,333	176,258	50.45	44.35
Other	34,582	28	19,733	427	12,000	1,800	33,960	68,542	50.45	36.35
Total	123,507	100	90,601	16,892	12,000	1,800	121,293	244,800	50.45	42.32
4th Quarter										
Transportation	85,159	70	68,385	15,996	.....	.....	84,381	169,540	50.23	44.54
Other	36,497	30	21,924	436	12,000	1,800	36,160	72,657	50.23	37.53
Total	121,656	100	90,309	16,432	12,000	1,800	120,541	242,197	50.23	42.61
TOTAL YEAR										
Transportation	370,417	73	293,722	68,499	.....	.....	362,221	732,638	50.56	44.23
Other	136,524	27	76,914	1,501	48,000	7,200	133,615	270,139	50.54	36.04
Total	506,941	100	370,636	70,000	48,000	7,200	495,836	1,002,777	50.55	42.23
1948										
TOTAL YEAR										
Transportation	313,395	70	265,677	68,108	.....	.....	333,845	647,240	48.42	45.88
Other	134,312	30	60,360	1,832	48,000	7,200	117,392	251,704	53.36	31.01
Total	447,707	100	326,037	70,000	48,000	7,200	451,237	898,944	49.80	42.14

NOTE: Based upon all conversions scheduled as of November 1, 1946 and the tire production schedule of October 1, 1946 for fourth quarter, 1946, and the Rubber Manufacturers' Association tire production schedule for 1947 and 1948.

Herbert M. James—Rubber Supply & Statistics Branch—Rubber Division, CPA—October 14, 1946 (NEW).

SCHEDULED UNIT PRODUCTION OF TIRES AND CAMELBACK, FOURTH QUARTER 1946, 1947, AND 1948*

Tires (Units)	1946	1947				Total	1948
	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter		Total
Airplane	100,000	66,000	78,000	86,000	77,000	307,000	376,000
Truck and bus	4,000,000	3,255,000	3,225,000	2,902,000	2,780,000	12,162,000	10,179,000
Tractor and implement	1,000,000	1,084,000	1,220,000	1,058,000	1,000,000	4,362,000	3,852,000
Solids	500,000	276,000	281,000	281,000	284,000	1,120,000	1,023,000
Industrial pneumatics	400,000	251,000	261,000	265,000	258,000	1,035,000	936,000
Passenger and motorcycle	18,500,000	18,582,000	18,404,000	16,768,000	16,320,000	70,074,000	63,580,000
Bicycle	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	10,000,000	9,000,000
Camelback (L.T.)	20,000	12,500	13,393	12,500	10,268	48,661	43,300

* Production of respective types of tubes have been estimated at a 1 to 1 ratio.

Source: 4th Quarter, 1946—4th Quarter 1946 Production Schedule dated October 1, 1946. 1947 and 1948—Rubber Manufacturers Association report dated October 1 and October 3, 1946, except that passenger tire production had been adjusted in 1947 to counteract a large company which had submitted a relatively low estimate.

Herbert H. James—Rubber Supply & Statistics Branch—Rubber Division, CPA—October 14, 1946 (J.A.)

It is considered of interest to insert another table of statistics at this time, even though it does not have the RMA as its source, since it bears directly on the estimated future production of tires and camelback. This table is one from the report of the October 18 Rubber Industry Advisory Committee meeting and provides figures on scheduled production of tires and camelback for the fourth quarter of 1946, for the four quarters of 1947, and a total figure for 1948.

Firestone on Business Outlook

Harvey S. Firestone, Jr., president of the Firestone company, spoke at the general session of the two hundred eighty-second meeting of the National Industrial Conference Board in New York on November 19. Mr. Firestone discussed "The Outlook for Business from the Standpoint of Distribution and Marketing."

In his opening remarks Mr. Firestone paid tribute to our economists and said that in spite of opinions to the contrary, they are right more often than they are wrong in their predictions and that business owes them a real debt of gratitude for the many important contributions which they have made to the economic progress of our country.

During the war we mentally divided the postwar era into three parts: the period of reconversion, the period of catching up with accumulated demand, and the period of self-sustaining economy. We have passed through the first of these periods in an amazingly short time, and we are now in the early stages of the second postwar period, that of catching up with accumulated demand. Mr. Firestone said. Economists are now forecasting a "boom and bust" period in 1947, and this forecast may be correct, not because supply will catch up with demand, but because increased manufacturing costs and lower manhour production may force retail prices temporarily to such high levels that people cannot afford to buy the output of our economy, even though they have greatly increased spendable incomes. The crying need today is for production. Anything that retards industrial output or prevents the increased flow of goods from factory to consumer may very well result in a recession which will leave in its wake lower national income and extensive unemployment. Such a trend is by no means a foregone conclusion, and because of many favorable factors the outlook for business from a marketing standpoint could hardly be more favorable. To make the most of it, it is necessary to prevent inventories from becoming excessive, to increase productivity per manhour, to keep costs as low as possible, and to see that prices are no higher than they need be.

The nation as a whole will not enter into the third postwar period, that of a self-sustaining economy, on any definite

day or, indeed, in any definite year, it was pointed out. The transition will come industry by industry and line by line, and it may take many years before every business will be in this period. But no matter when it comes, it will mark the beginning of a critical era in the history of our country.

Since we shall probably enter gradually into this final period in which our economy must sustain itself, we should be able to avoid any sharp depression. Whether or not we shall succeed will depend largely on three factors: how good a job management and labor do in producing goods efficiently, the kind of environment that business has in which to operate, and how successful industry is in developing new and better products and marketing them aggressively at low prices, continued Mr. Firestone. In the period of self-sustaining economy which is to come, distribution will become a more vital factor in American business than ever before.

It is going to be difficult for us to get back into the good habits of hard selling and rigid frugality, and so the watchword of the Firestone company for this year and next year is "Learn to Sell Again, Learn to Save Again." It was also emphasized that if we are to be prepared for the continuous long range planning

which will become an essential part of every well-organized business in the future, we should begin at the grass roots by fostering and encouraging young men to consider the science of distribution as their life work and by persuading universities and colleges to offer regular courses of study, which will eventually result in the granting of degrees in market research, sales management, and other phases of distribution.

In recent years the temptation to try certain experiments, however noble, has placed limits on ambition, on opportunity, and on ability. Recent developments indicate that we are returning to the original concept of a free nation, a land in which a man may rise as high as his will and his skill will permit. Once we regain this freedom, the mantle of responsibility for providing full employment and maintaining and expanding the standards of living will again rest upon the shoulders of private industry. If free enterprise is to survive, industry must succeed. And a measure of its success will depend on its ability to distribute the products of the factory, the forest, and the farm, economically, efficiently, and intelligently, so that more people may enjoy more of the good things of life, Mr. Firestone concluded.

Industrial Relations Developments

More information regarding the meeting of the new international policy committee of the United Rubber Workers of America Union (CIO), which was held in South Bend, Ind., on October 27 and 28 to consider new wage demands to be made on the rubber industry, have become available. An increase of 26¢ an hour was asked for, and the union because of the "Big Four" agreement of March 2, 1946, first approached these companies. This agreement provides for reopening of wage negotiations only on a "Big Four" basis and only if "economic conditions warrant it." The companies have indicated their willingness to meet with the union in Philadelphia on December 6 to discuss whether or not the "Big Four" agreement permits reopening the wage question at this time, not for the purpose of discussing the wage question itself. Disputes at Goodyear, Seiberling, and Goodrich, in Akron, and at Pennsylvania Rubber in Jeannette, Pa., during late October and November caused shutdowns of about a week in these cases.

The URWA Wage Demand

More than 200 delegates from local unions of the URWA met with the international union officers in South Bend on October 27 and 28 to discuss ways

and means of presenting the demand of the union for another increase in wage rates. The delegates heard A. L. Lewis, research director for the union, present figures on which the wage increase demand would be based. Using figures from the Bureau of Labor Statistics, Dr. Lewis pointed out that the average rubber worker with a family of four, earning, as of July, 1946, a wage of \$56.11 a week, spends \$35.18 of this for food. Key food items have gone up 50% in the last 30 days, he added. Tire and tube builders reached their peak in earnings in February, 1945, [during the all-out tire production drive] with an average weekly wage of \$64.04, but in July, 1946, the average wage was \$56.11.

Just to show how the selection of the figures may be arranged to support either side of the question of increase or decrease in earnings, India RUBBER WORLD recently received a report from the Bureau of Labor Statistics for release on October 25, 1946, which stated that weekly earnings in all manufacturing industries increased to \$45.10 in September, 1946, more than \$4 above a year ago, and that retail prices of consumer goods rose about 13% over the same period. This report gave detailed figures for average weekly earnings of workers in the rubber

industry as follows: rubber tires and tubes, average weekly earnings August, 1946, \$55.43, or 8.1% above August, 1945; rubber boots and shoes, August, 1946, \$44.45, or 4.8% above August, 1945; and other rubber goods, August, 1946, \$46.91, or 15.7% above August, 1945. The September, 1946, average weekly wage for tire and tube workers was \$59.91.

Figures taken from the financial statements of the Big Four rubber companies were then quoted by Dr. Lewis. The net profit of The B. F. Goodrich Co. for the first six months of 1946 was \$12,470,390, as compared with \$12,313,501 for all of 1945. Goodyear Tire & Rubber Co. had a net profit of \$15,088,189 for the first six months of 1946, as compared with \$15,136,816 for all of 1945. Figures for the other two companies for the same periods were: Firestone Tire & Rubber Co., \$12,843,926 against \$16,446,795; and U. S. Rubber, \$9,906,886, against \$13,024,778 for all of 1945. Following discussion of these figures, delegates entered into a general talk on various plans to be employed in seeking higher wages.

The URWA asked the Big Four companies to reopen the present contracts and permit an upward revision of wages, but the companies replied that the present rise in the cost of living was temporary and did not warrant reopening of the labor contracts at this time. In addition the companies pointed out that worker productivity is lower now than before the war, and wildcat strikes due to lack of satisfactory union discipline are costing a lot of money.

It was finally announced that representatives of the Big Four companies would meet with representatives of the URWA in Philadelphia, on December 6, to discuss a possible reopening of the Big Four contract. It was emphasized that the wage demand itself would not be discussed, but merely whether or not the Big Four contract of March 2, 1946, could really be considered as permitting a discussion of wage increases under existing conditions.

Associated with this question of reopening the Big Four contracts was the campaign the URWA has been carrying on to have the companies concerned bargain on a company-wide basis. Two companies, U. S. Rubber and Goodyear, are reported to have agreed to meet with the union to discuss the possibility.

U. S. Rubber has indicated several conditions to its agreeing to company-wide bargaining: the presence of a full-time URWA official to U. S. Rubber plants to prevent wildcat strikes, and the institution of an educational program among the members of the union in these plants to stress the general responsibility of the union members under the company-union contracts.

Miscellaneous Work Stoppages

The difficulty reported last month at the Goodyear plant in Akron, which began on October 17, resulted in a one-week shutdown of the tire and tube production of this plant. A report of this trouble taken from the *Wingfoot Clan* for October 30, reads as follows:

"Tire and tube production at Plants 1 and 2 on second shift, Thursday, October 24, was resumed, following the week's work stoppage which started Thursday, October 17, on second shift in the Plant 1 mill room. The stoppage was precipitated when two members of a Banbury mixing crew refused to work while their complaint was in process of negotiation. Other mill room employees on that shift stopped work in sympathy.

"Although the executive board of the union instructed the men to return Monday, October 21, workers did not actually resume work until October 24, the end of the suspension period of the two employees.

"During the week in which the tire and tube machinery of both plants was idle, a total of 7,085,000 pounds of production was lost and employees lost \$518,244 in wages. Mechanical goods, Airfoam, rims and the reclaim plant continued to operate on normal schedule during the week."

At about the same time, on October 24, following the discharge by the Seiberling Rubber Co. in Akron of a millroom employ for using vile and obscene language to his foreman, this plant was shut down until October 28, by virtue of a sympathy walkout of 2,000 employees. The company refused the union's request to rehire this worker, and finally at a meeting of the local union on October 26 the workers voted to return to work. This plant had another day's loss of production when maintenance workers refused to work on Sunday, November 3. Following the necessary work on Monday, production was resumed on November 5. The maintenance men objected to Sunday work.

A dispute at the Jeannette, Pa., plant of the Pennsylvania Rubber Co. curtailed production for several days in late October. Additional wage increases were granted to employees of the shipping department, who claimed they did not receive the increase granted to other workers when a strike at this plant ended late last summer.

Workers in the Airfoam curing department at Goodyear in Akron after a one-

day shutdown, following a dispute over wage rates, returned to work on November 15.

About 100 workers at the Firestone Steel Products Co., Akron, walked out on November 14 in a dispute over wage allowance rates.

A walkout also occurred at the Karman Rubber Co. in Akron on November 14. Company officials could not give a reason for this work stoppage.

About ten strikes which tied up rubber manufacturing plants in Ontario, Canada, for most of the summer were settled by the end of October. More than 8,000 workers were involved in the walkouts. Demands of the URWA local unions were for a general increase of 20¢ an hour and a 40-hour week. Most of the settlements were on the basis of 13¢ an hour increases. Plants involved included Dominion Rubber Co., Ltd., Kitchener; Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto; Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton; B. F. Goodrich Co. of Canada, Ltd., Kitchener; Seiberling Rubber Co. of Canada, Ltd., Toronto; Barringham Rubber Co., Ltd., Oakville; and Goodyear at Bowmanville.

Local URWA union in Akron, O., held elections during November. I. H. Watson, was reelected president of Firestone local No. 7; George R. Bass was reelected president of Goodrich local No. 5; Joseph W. Childs was elected president of General Tire local No. 9; and James F. Brumbaugh was elected president of Mohawk local No. 6. Election of officers at Goodyear local No. 2 were scheduled for late in November.

CPA Permits Use of More Natural Rubber

The percentage of natural rubber which may be used in making small and medium-size passenger tires, constituting 95% of those manufactured, has been increased from 13 to 23%. Large passenger tires, formerly allowed 13% natural rubber, are now permitted 67%. In addition, tires of 11:00-inch cross-section and larger of all types including truck, bus, earth mover, and special-purpose may be made with as much natural rubber as the individual manufacturer wishes to consume. All other types of small pneumatic tires, including small pneumatic industrials with less than eight-ply, may now be made with 13% natural rubber instead of 2.5% as formerly allowed.

These are the major changes in the tire production pattern provided in a revision of Appendix II of R-1, issued October 30. The additional consumption of natural rubber can be permitted because it has been possible for the United States to obtain for shipment from Far East ports during the fourth quarter of the year more than 200,000 tons of natural rubber, W. James Sears, director of CPA's Rubber Division, said.

Passenger-car tires made with a high percentage of synthetic rubber give adequate performance in 90% of all normal driving, but large passenger cars heavily loaded and driven at high speeds place a strain on tires over and above that encountered in normal passenger use, Mr. Sears explained. Technical requirements for satisfactory performance in these large sizes call for more natural rubber than in the smaller sizes.

Heretofore the variation of natural rubber consumption in any one tire size in any

one tire group was limited to 5% provided the stipulated consumption of natural rubber in the tire group was not exceeded. This variation has been relaxed to 10% for all tire groups except in large truck tires which contain 94% natural rubber. The variation in this group remains at 5%. Therefore there will be no all-natural-rubber tire smaller than 11:00-inch cross-section, Mr. Sears explained.

Tire and flap curing bags now may be made with as much natural rubber or Butyl as the manufacturer desires. Previously the use of Butyl was not permitted.

In order that tire manufacturers may familiarize themselves with the problems of producing white sidewall passenger-car tires, production of 50 experimental tires with white sidewalls will be permitted in any one month for any tire producing plant. These tires will be marked "Exp!" and will be of standard passenger-car tire construction.

Hereafter tire markings on synthetic tires will not be required, as the various synthetic constructions are now so grouped in tire sizes that it will be possible for the reclaimers to sort tires by tire size instead of marking.

CPA on November 15 also permitted 36 additional types of products to be made with some natural rubber, increased the amount of natural rubber which may be used in 28 others, and in 121 other items permitted manufacturers to use as high a percentage of Butyl as they wish. Actually, the number of individual products which may be manufactured under these

changes will be many times these figures because various sizes and styles of each type of product will be permitted, CPA said. The new specifications for products, contained in Appendix I of R-1, as reissued November 15, permit an increase of about 1% in the amount of natural rubber which now may be used.

Consumption of natural rubber latex and certain qualities of crepe natural rubber are still under rigid control because of extremely short supply, since these types have not yet returned to quantity production in the Far East, CPA explained.

The new specifications authorize the rubber manufacturing industry to use each month—either for consumption or for improvement of inventory—38,000 long tons of natural rubber, 52,000 long tons of GR-S, and 7,000 tons of GR-I.

In addition, CPA said, neoprene, both dry and latex, and the N-type rubbers (butadiene-acrylonitrile) will be produced in sufficient quantity to meet all demand. Present schedules call for the production of approximately 6,000 long tons of these rubbers per month.

"The changes which have been made to the rubber order are in accord with the 'long-term' recommendation of the Inter Agency Policy Committee for Rubber which has been submitted to the President and Congress," W. James Sears, director of CPA's Rubber Division, said.

Items which now follow the recommendations of the IPCR in the use of natural rubber are: oil well supplies, rubber parts used in drilling, testing, cementing and pumping; all rubber products used in printing; chemical blown-sponge rubber for all purposes; rubber bands; bathing caps.

The relaxations in control of the use of natural rubber also follow generally the recommendations of the various technical consulting committees of the Rubber Division of CPA and conform to the overall policy approved by the Rubber Industry Advisory Committee that all segments of the rubber manufacturing industry be permitted the same percentage of natural rubber in so far as practical.

No further changes in R-1 affecting the consumption of natural rubber are contemplated for the balance of 1946, CPA said.

All reference to chlorinated natural rubber has been eliminated from the order and from Appendix I because this material is now considered a finished product.

In general, restrictions on the manufacture of rubber belting have been relaxed, although most types of belting are still limited as to the amounts of natural rubber permitted. Conveyor and elevator belts are permitted 35% natural rubber. The color of belting must be black except when for use in contact with unpackaged food.

Previously with only minor exceptions all Butyl rubber has been channeled into the production of inner tubes for tires. Improvement of the supply of Butyl and the availability of more natural rubber for inner tubes permit the use of Butyl in new products. In addition any manufacturer may now use 200 pounds per month for experimental purposes without specific authorization. Formerly only 25 pounds had been allowed.

Heretofore 25 pounds of natural rubber latex per month were permitted for experimentation in products other than cement. In the future, because of the extreme shortness of supply, no natural rubber latex will be permitted for ex-

perimentation except on appeal. All restrictions in the use of GR-S for experimentation have been removed.

Then on November 21 CPA announced that it was preparing to amend R-1 to permit vehicle manufacturers to sell spare tires and tubes with new vehicles on and after December 16, 1946. Advance notice of the proposed amendment is being given to permit the rubber manufacturing industry to adjust production schedules. The amended order will retain the present provision restricting stocks of

new tires held by vehicle manufacturers to the number needed for the new vehicles scheduled to be produced in any succeeding 15-day period. The decision to permit spare tires and tubes was based on an estimated production of more than 16,000,000 passenger-car tires from October 1 to December 15. CPA officials estimated that 12,000,000 of these would be sold as replacements, increasing the availability of replacements during the winter months, when tire wear usually diminishes.

OPA Removes Price Control from All Goods Except Sugar and Rice

On November 10, SO 193 became effective to exempt from price control all commodities (including services) except sugar and rice.

The following orders, however, had been issued prior to the general decontrol order and are given to keep our records complete.

The OPA recently issued several long lists of items decontrolled because supply and demand are in approximate balance, or because certain items are considered unimportant in business or living costs.

Among products removed from price control by Amendment 63 to SO 129—Exemption and Suspension from Price Control of Machines, Parts, Industrial Materials and Services—were: recapped and used tires of 8.25 cross-section and larger; tire recapping and repair services; camelback; and industrial flat solid woven cotton belting impregnated with liquid rubber. The following were decontrolled by Amendment 64: automotive and bicycle mud guards or flaps; automotive pedal pads and windshield wiper blades; rubber paint; passenger tire flaps; barium chemicals; chlorinated natural rubber; furnace carbon blacks, including, but not limited to semi-reinforcing and high-modulus grades; sodium silicates.

Among the items exempted by Amendment 65 were: plastic battery containers for use with electric storage batteries; air gages (subject to RMPR 136) for determining pressure in pneumatic tires; certain printers' rollers.

Amendment 72 to SO 126—Exemption and Suspension of Certain Articles of Consumer Goods from Price Control—covers, among other commodities, rug and carpet binding with adhesive back (to be applied with a hot iron), for repairing worn or raveled rugs; and adhesive back cloth (also to be applied with a hot iron), for repairing men's and children's clothing.

Order 46, RMPR 143 — Wholesale Prices for New Rubber Tires and Tubes—authorizes maximum prices for a new size and type of truck tire, in natural or synthetic rubber—CC-12, 5.50x18, six-ply. Order 47 sets retail ceilings for two Road Lug truck tires made by The Goodyear Tire & Rubber Co., Akron, O.; and Order 48 does likewise for 13 sizes of the same company's industrial solid pressed-on truck tires.

Amendment 1, order 22, MPR 477, makes a change in the maximum prices for all sellers of Genuine Panco taps, black (standard grade); Panco corrugated taps, black (standard grade); and Surestep taps, black (competitive grade)

—all products of Panther-Panco Co., Inc.

Region IV Order G-2 under SSR 47 to RMPR 165—Shoe Repair Services in Atlanta Region—redefines "Group A" Grades, Compo-Dress Half-soles" to cover Neolite half-soles manufactured by Goodyear Tire & Rubber Co., and Panolene half-soles made by Panther-Panco Rubber Co.

Manufacturers of coated and combined fabrics, except window shade cloth, may change their own ceiling prices by adding or subtracting the dollar-and-cent amount of any change in their costs for cotton greige goods occurring after August 9, 1946. All changes must be noted separately on customer invoices. The increases may be passed on by wholesalers, supply jobbers, and retailers. (Amendment 20 and Amendment 2 to RO 157 and to Order 158, MPR 478—Coated and Combined Fabrics.)

The following orders were added to MPR 478, setting maximum prices for vinylite, pyroxylin, or synthetic rubber coated fabrics of the companies named: Order 210, Foxtex, Inc., Spartanburg, S. C.; 211, Henry W. T. Mali & Co., New York, N. Y.; 212, Walton Cotton Mills Co., Monroe, Ga.; 213, 214, 220, 221 Weymouth Art Leather Co., Inc., South Braintree, Mass.; 219, Prince Lauten Corp., New York; 222, Unity Leather & Textile Co., Boston, Mass.

Producers ceilings for dibutyl phthalate have been raised 8/10-cent a pound by Amendment 22 to MPR 37—Butyl Alcohol and Esters thereof—effective November 7. This change was made to take care of higher costs for one of the basic raw materials, phthalic anhydride. Dibutyl phthalate is used in the production of synthetic rubber, paints, textile coatings, etc.

Increases of 15% have been allowed in ceiling prices for one segment of a variety of rubber items sold for use in the manufacture of automobiles, refrigerators, vacuum cleaners, and electrical appliances, according to Amendment 31 to MPR 149—Mechanical Rubber Goods—effective November 12. The increases apply to that segment of production having January, 1942, base date established prices. On this segment of production, approximately 20% of total output, increases of 2% were allowed on October 2, 1946; while on the remaining 80% of production increases of 17% were granted. Different increases were provided at that time because on the smaller segment increases aggregating 15% had been granted previously. Amendment 31 results in a full 17% increase over October 1, 1946, levels for all production of these molded, extruded, lathe-cut, and chemically blown sponge rubber goods.

The United States Department of Commerce, Office of International Trade, Washington, D. C., in "Current Export Bulletin No. 373," October 28, 1946, in its revisions in the Positive List removes therefrom the following commodities and places them on general licenses for exportation to destinations in Group K: rubber boots; surgeon's rubber gloves; casings and inner tubes; farm implements, industrial and wheelbarrows only; tire sundries and repair materials other than camelback; textile covered rubber thread; natural and synthetic rubber manufactures not elsewhere specified.

OIT, according to Bulletin 377, November 12, has announced that owing to a substantial increase in the number of applications to export new passenger-car, truck, and bus tires of all grades, including factory seconds, and the quantitative limitations imposed by the export quota, licenses for non-traditional exporters of such tires who qualify for Veterans Preference may be validated by no more than 150 tires a quarter; and licenses for non-traditional exporters who do not qualify for Veterans Preference, to 100 tires a quarter. Tubes to be exported for use with the tires and in no greater number may be applied for on the same license application.

Bulletin 379, November 18, reports that exports of carbon black to Group K countries are on a consolidated license basis. Under this procedure applicants should submit a separate consolidated license application quarterly covering the exportation of each group of carbon black as follows: Group 1, channel black for rubber end use; Group 2, channel black for end use other than rubber; Group 3, furnace and other types of carbon black for rubber end use; Group 4, furnace and other types of carbon black for end use other than rubber. Applicants for consolidated licenses must have firm orders for the exportation of carbon black, and the total amount covered by all applications must not exceed the amount of firm orders on hand when the applications are filed.

Walker Rubber Products Mfg. Co., is the firm name under which George L. Walker and Leroy Ketter have published a certificate that they are conducting business at Firestone Blvd., South Gate, Calif.

Richard L. Kroesen has resigned as president and director of Johnson Rubber Co., Middlefield, to devote his entire time to his position as president of Cleveland Sporting Goods Co.

OBITUARY

J. Edgar Pew

AFTER a long illness J. Edgar Pew, vice president in charge of production at Sun Oil Co., Philadelphia, Pa., died November 22 in his Villanova, Pa., home.

Mr. Pew, who was born in Mercer, Pa., 76 years ago, started his business career at the age of 16, after graduation from

Iron City Business College, as a plumber's helper with the People's Natural Gas Co., founded by his uncle, Joseph Newton Pew, Sr., in Pittsburgh. Then in 1896 the deceased joined Sun, also organized by his uncle, at the company's first oil refinery at Toledo, O., and in 1901 was transferred to field operations in Beaumont, Tex. He resigned in 1913, but resumed service with the company in 1919 as a vice president and also as president of the subsidiary, Sun Pipe Line Co., Beaumont. During the time he was not in Sun's employ he had been an independent oil producer in Tulsa, Okla., and then vice president and western manager of Carter Oil Co. Since January 1, 1936, Mr. Pew had his headquarters at Sun's main office in Philadelphia.

Long credited with being a leader in the advancement and standardization of scientific methods of oil discovery and development of field machinery and equipment, Mr. Pew served as director of the American Petroleum Institute, American Institute of Mining & Metallurgical Engineers, Franklin Institute of Philadelphia, the Mid-Continent Oil & Gas Association, and the American Society for Testing Materials. He had also been president of Mid-Continent Oil & Gas for three years (1916-19) and second vice president of the API (1924-25). He had, moreover, been chairman of the API committee on petroleum reserves since its formation in 1935, and in June, 1945, had been selected as the industry's spokesman to present data on American petroleum resources to the U. S. Senate Petroleum Investigating Committee. Mr. Pew had also been awarded (its first recipient) the Anthony F. Lucas Gold Medal for distinguished service to the petroleum industry, given annually since 1936 by the ATIME, and the Texas Mid-Continent Oil & Gas Association's Distinguished Service Award.

Mr. Pew was also a Mason and a Shriner and belonged to the Dallas Petroleum, the Beaumont and Tulsa clubs, the Brook Hollow Golf Club of Dallas, and the Union League, Racquet, Midday, Merion Cricket, and Philadelphia Country clubs in Philadelphia.

Surviving are his wife, two sons, a daughter, two sisters, a twin brother, and two first cousins, Joseph N. Pew, Jr., vice president of Sun Oil, and J. Howard Pew, president of the company.

Martin D. Scott

MARTIN D. SCOTT, 67, with Goodyear Tire & Rubber Co., for more than 43 years and a pioneer in the company's development of pneumatic tires for long-distance truck operations, died October 27 at his home in Akron. He had been in failing health for about one year.

Formerly manager of Goodyear's garage and test fleet operations, Mr. Scott joined the company in 1903 and was placed in charge of carriage tire stock. He later became foreman of the shipping room and in 1911 was made manager of the company's garage, being continuously associated with that division during the remainder of his Goodyear career. The deceased was Goodyear's first test-car driver, but is probably best known for the important role he played in proving the practicability of pneumatic tires for long hauls when these tires were first introduced by Goodyear.

A native of Ohio, Mr. Scott was born and raised in Mansfield, where he attended the public schools and Mansfield Business College, before coming to Goodyear in Akron.

He is survived by his wife, a son, eight daughters, two brothers, two sisters, and 11 grandchildren.

Funeral services were held October 30, and burial took place in East Akron Cemetery.

Edward Osborne

EDWARD OSBORNE, assistant treasurer of the Davol Rubber Co., Providence, R. I., died November 3 in Providence after a brief illness. He was born in New York, N. Y., August 10, 1872. He began his 47-year service with Davol in September, 1899, as an accountant and until August, 1937, when he was elected to the assistant treasurership, he had served successively as chief accountant and general auditor.

He was a member of the Providence Chapter of the National Association of Cost Accountants and the Washington Park Community Club besides being treasurer of the Davol Mutual Benefit Association.

Mr. Osborne is survived by a wife and a daughter.

Frank Cross

FRANK CROSS, secretary-treasurer and a director of the Sun Oil Co., Philadelphia, Pa., is dead. He was 76 years old when he passed away on November 25 in a hospital in Philadelphia, after having been ill only a short time.

Mr. Cross joined Sun in Pittsburgh in 1898 as a bookkeeper after attendance at the Grove City College and the Bryant & Stratton Business College in Buffalo and after working at several odd jobs. When the company moved to Philadelphia three years later he was advanced to the position of treasurer.

He also served as secretary, treasurer, and a director of the Sun Oil Line Co., the Sperry-Sun Well-Surveying Co., Sun Oil Co. of Ohio, Sun Oil Co., Ltd., the Sun Pipe Line Co. of Illinois, the Sun Pipe Line Co. of Texas, the Susquehanna Pipe Line, the Motor Tankship Corp., the Fisher County Producing Co., and the Middlesex Pipe Line Co., as assistant secretary, assistant treasurer, and a director of the Sun Shipbuilding & Dry Dock Co., a director of Cia. Sunoco de Cuba, Merchantville Bank & Trust Co., and the North Chester Realty Co.; secretary-treasurer of the Sun Pipe Line, Inc.; as secretary and a director of Sun Transportation Co.; assistant treasurer of the Horse Heaven Mines, Inc.; treasurer of the Cordero Mining Co. of Texas, and treasurer and a director of Martin & Schwartz, Inc. and the Precision Development Co. He was also past president of the Credit Men's Association of Eastern Pennsylvania and of the Presbyterian Social Union of Philadelphia.

The deceased was born in Clintonville, Pa.

He was a Mason, a member of the Union League, and of the Merchantville, N. J., School Board, and a trustee of the Merchantville Presbyterian Church.

Besides his widow he leaves three daughters.

EASTERN AND SOUTHERN

Du Pont Opens Rubber Service in Akron



Ralph B. Appleby

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., formally opened a new, modern, fully equipped laboratory for complete and prompt service to rubber manufacturers of the Midwest, at 40 E. Buchtel Ave. at High St. in Akron, O., on November 22. For many years du Pont has provided technical service to the rubber industry from the rubber laboratory at the Chambers Works plant in Deepwater Point, N. J. Now all technical problems originating in the Midwest will be handled at the Akron laboratory, and information on developments made in either laboratory will be immediately available to the other.

The new Akron laboratory was open all day on November 22 for public inspection and a host of visitors from the middle west area inspected the series of offices, and rooms devoted to experimental work with natural and synthetic rubbers. The Akron Chamber of Commerce and executives of the rubber industry welcomed W. S. Carpenter, Jr., president, and other du Pont officials at a luncheon at the Mayflower Hotel and at a meeting of the Akron Rubber Group, also held at the Mayflower Hotel in the evening. Ernest R. Bridgewater, manager of the rubber chemicals division of the du Pont company, introduced Charles J. Mighton, manager of the new laboratory, and Embert L. Stangor, rubber technologist at the Akron laboratory, both of whom read papers before the Group. A cocktail party given by the Akron branch, rubber chemicals division of the du Pont company, in the banquet room of the hotel, preceded the Group meeting.

The Chamber of Commerce Luncheon

In addition to Mr. Carpenter prominent executives of the rubber industry and other Akron organizations seated at the speakers' table during the Chamber of Commerce luncheon included: Lynn Holcomb, managing editor, *Akron Beacon-Journal*; W. O'Neil, president, General Tire & Rubber Co.; J. J. Newman, vice president, B. F. Goodrich Co.; J. W. Thomas, chairman of the board, Firestone Tire & Rubber Co.; John Thorpe,

president, Akron Chamber of Commerce; R. P. Dinsmore, vice president, Good-year Tire & Rubber Co.; J. Penfield Sieberling, president, Sieberling Rubber Co.; and Vince Johnson, executive vice president, Akron Chamber of Commerce.

Following an address of welcome by Mr. Thorpe to the du Pont company on the occasion of the opening of the new rubber laboratory, Mr. Carpenter thanked the Akron Chamber of Commerce and the rubber industry in Akron for their very generous hospitality and then delivered an address based on some thoughts regarding the American system of free enterprise as compared with other economic systems. These thoughts were prompted by a trip abroad which he had made a few weeks ago.

Mr. Carpenter first called attention to the gradual, creeping progression which has been made in one form or another in the seizure by the State of more and more of those prerogatives which have formerly been recognized as the liberties and pursuits of the individual citizens, with special reference to the encroachment of the government upon the field of private industry. He reviewed the important development of the election of a government of the Labor or socialistic party in Great Britain and questioned whether the new method of nationalization is to be preferred to that of the former free economy. Some of us may wonder whether England, in forsaking liberty in her economic area, will, in the long run, benefit her people, the speaker said, and then added that perhaps at this early date we should not judge too quickly or too harshly whether her people have selected the best course to pursue.

"Turning to our own country, we find an industrial system based on the private enterprise system, and with it the presence of a powerful force—a harsh taskmaster and yet a great sovereign—Competition. Competition which reminds us daily that an essential requirement of successful industry is that it must operate efficiently. Industrial units in America cannot coast along under the protection of a shelter of fixed prices or of government ownership, either of which may



Harry A. Hoffman

obscure the accumulation of obsolescence in our plant and increase of costs," Mr. Carpenter declared.

"The question has sometimes been posed whether we, in this country, in endeavoring to maintain a free, competitive economy, are not in fact fighting a losing rearguard action in view of the adoption of some form of nationalization of industry in almost all other countries," he added. "It is gratifying to note that, with this survival of liberty in our economic life in this country, the results of the operation of our economic system have outstripped our fondest hopes and have excelled the achievements of the people of all other nations.

"Our own system has encouraged and stimulated the enterprise, the hopes and the aspirations of the millions to greater achievement. It has rewarded those who have enhanced the welfare of the community by their labors. Contrariwise, under the socialistic philosophy, in whatever lands adopted, the few have prescribed the work of many, and the few have enjoyed or disposed of the meager results.

"In brief, my own thoughts on this subject have persuaded me that we have no need or room here for desperate, alien, economic philosophies. I believe, too, that the sound judgment of the American people, if informed, will always reach a similar conclusion," said Mr. Carpenter.

The Akron Rubber Laboratory

Du Pont's new rubber service laboratory is housed in a two-story brick building. The entrance lobby and the receptionist's desk are on the first floor, and visitors may then be conducted by a stairway from the entrance lobby in the front of the building to the second floor where the offices of Harry A. Hoffman, Akron branch manager; Ralph B. Appleby, technical sales representative, Ohio district; Charles J. Mighton, Akron laboratory manager; Embert L. Stangor, rubber technologist; and Mrs. F. Irene Scott Farr, office manager, all of the rubber chemicals division, may be found. The second floor foyer, from which entrance to these various offices and the conference room may be made, features an exhibit of rubber products made with neoprene and other rubbers by the various rubber fabricating companies.

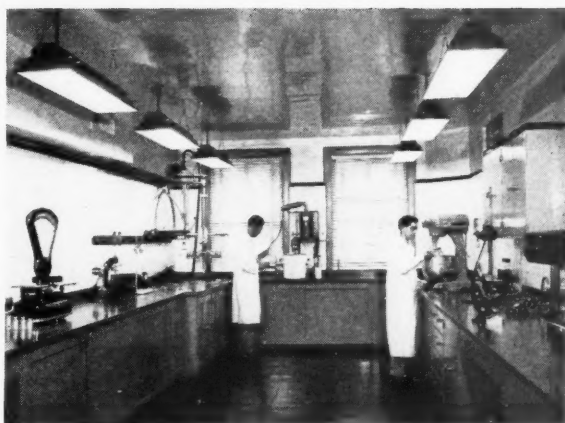
One leaves the second floor foyer by a corridor going toward the rear of the building, and on the right of this cor-



Charles J. Mighton



Thurman M. Taylor at Work at One of the Two Presses Closed off from the Main Mill Room and Operated by Remote Control



The Latex Laboratory—Dipping Machine in Left Background; Water Still in Rear; Hobart Beater in Right Background

ridor is the latex laboratory. This room, as may be seen from the accompanying illustration, is modern throughout with constant temperature and humidity control, fluorescent lighting, ample enclosed storage space, and slate-topped working surfaces running the full length of the room along both sides. Among the pieces of equipment included in this laboratory for work on latex problems are: ball mills of 5-, 2-, and one-gallon capacity; a Manton-Gaulin, Type LP, colloid mill; various mixers, such as a Waring blender for preparing emulsions and dispersions and a Hobart beater for frothing latex for the manufacture of "foam sponge"; a Stormer rotating cylinder viscometer; a Beckman pH meter; A Cenco Du Nuoy tensionmeter for surface tension measurements; a microscope for particle size measurements; Federal thickness gages; and a Barnstead water still.

A specially designed latex dipping machine, constructed so as to duplicate as closely as possible actual plant dipping procedures in the manufacture of balloons, gloves, bath caps, baby pants, overshoes, coated dish racks, and many other articles made from latex, may be seen in the left background of the illustration. This machine, built of stainless steel and operated by a variable speed motor, has three tanks, one for the latex compound, another for coagulation of the dipped film, and the third for leaching the film with water. In operation, it first lowers and raises forms, on which the latex is deposited, in and out of the latex compound tank at a uniform speed to avoid uneven deposits of the rubber. After the dipping operation the coated forms are moved on the machine and lowered into the tank of coagulant, where the deposit is set, and finally the forms and the deposit are lowered into a constant temperature water bath where salts and other undesirable impurities are leached from the film. Following these operations the forms are removed from the machine, and the films dried and cured in ovens.

Across the corridor on the second floor is the air-conditioned physical testing room which contains special facilities for high and low temperature testing, measurement of abrasion resistance, flex- or cut-growth resistance, viscosity, heat build-up, and other standard evaluations of rubber products. The Scott tensile machine is equipped with a cabinet through which hot or cold air may be

circulated for tests at other than room temperature. Other equipment includes a Goodrich flexometer with an automatic temperature recording device, a DeMattia flexer, Bureau of Standards and du Pont abrasion machines, a Mooney plastometer, an American Instrument Co. cold box, and numerous small devices for measuring resilience and compression set. Four constant-temperature air ovens and an oxygen bomb are located in another small room adjoining the physical testing room. A United Shoe Machinery clicker is available for cutting out test samples. A special piece of equipment for determining the operating characteristics of solid industrial truck tires is located on the ground floor. There is also equipment for testing the effects of ozone in high concentrations on products designed for use under these conditions.

A stairway from the second corridor in the rear of the building connects with the ground floor, where the mill room, curing room, and weighing room are located. Adjoining these rooms is the office of Thurman M. Taylor, processing supervisor for the Akron laboratory. Equipment in the mill room consists of one 6 by 12 and one 10 by 12, two-roll Stewart Bolling mills a 20-inch, three-roll calender, with all standard attachments, also by Stewart Bolling; a model 00, laboratory Banbury; and a No. 1 Royle tuber, for use with either plastics or rubber. At the rear of the mill room is a separate room for weighing out rubbers and compounding ingredients.

An interesting feature of the curing equipment is that it is separated from the working space of the mill room. The two, single-platen, National-Erie Corp. 24 by 24 inch, hydraulic presses and the Biggs Boiler Works vulcanizing autoclave are operated by remote control from outside the enclosing wall. The Biggs vulcanizer is equipped to use either steam or air internally or in the jacket. Automatic temperature recorders, gages, and valves are mounted outside the press room, and sliding doors allow access to the press platens. This arrangement not only makes for better working conditions, but insures a uniform temperature surrounding the curing presses. The accompanying illustration shows Mr. Taylor at work at one of the two presses.

The basement of the laboratory building is divided into a room housing the incoming steam main and distributing pipes, together with a steam hot-water

heater and an air compressor, a room for the electrical controls and switches, and a room for storage of materials for laboratory use and emergency delivery of du Pont rubber chemicals by the Akron branch. A loading platform and service elevator connecting the basement and ground floors are also in the basement.

Other du Pont News

The company has also announced that Stewart L. Rankin, M.D., has joined the staff of the petroleum chemicals division of its organic chemicals department to direct the special studies of that division. Dr. Rankin had been physician at the Louisville, Ky., neoprene plant which du Pont built and is operating for the government. He first joined the company in 1937 on the medical staff at the Chambers Works, Deepwater, N. J., and in 1940 was appointed physician at the Indiana Ordnance Works, Charlestown, Ind., also built and operated for the government by du Pont; he subsequently became supervisor of the medical division there. Then in 1944 the doctor was made superintendent of the medical department of the tetraethyl lead plant at Baton Rouge, La. Early in 1946 he was assigned to the neoprene plant.

Du Pont's pigments department recently announced plans for a new manufacturing unit at the company's titanium dioxide plant at Edge Moor, Del. This unit is the second Du Pont titanium expansion to be started since the end of the war and the seventh major expansion undertaken by the company since starting manufacture of titanium in 1931. Approval of the new project has already been obtained from the CPA. Much of the equipment to be installed cannot be procured except under long-term delivery; so completion is not contemplated until some time in 1948. The plant's current capacity is also being increased through modification of existing equipment and processes. This phase of the expansion program begun last spring is scheduled for completion in May, 1947. The expansions at the Edge Moor plant will add several hundred employees to the roster, the company stated. The plant manufactures titanium dioxide and titanium calcium pigments, demand for both of which has continued to run far ahead of existing production capacities.

Dispersions Process Absorbed; Other U. S. Rubber Announcements

Naugatuck Chemical, division of United States Rubber Co., Rockefeller Center, New York 20, N. Y., through George R. Vila, sales manager of colloids and resins, has announced that as of November 1, Dispersions Process, Inc., no longer exists under that title, and all matters pertaining thereto should be referred to Naugatuck Chemical, Naugatuck, Conn. In addition sales headquarters for Naugatuck colloids, including latex, Lotol, and Dispersite, have been transferred from the New York office to the Connecticut one. Branch offices, however, are being maintained as formerly: for New England, 560 Atlantic Ave., Boston 10, Mass., with S. H. Tyng representative; Middle and Southern Atlantic States, Naugatuck, Conn., G. L. Dennis; for Ohio, 31 N. Summit St., Akron 8, O., A. J. Marshall; Midwest, 6300 E. Jefferson Ave., Detroit 32, Mich., H. J. Long. C. H. Sigler is representative from the main sales office at Naugatuck.

Changes in Personnel

Establishment of a Detroit sales division and five appointments were announced recently by W. D. Baldwin, sales manager of the U. S. Tires division.

John A. Boll was named manager of the newly formed Detroit division. His territory will include the Cincinnati, Cleveland, Indianapolis, Pittsburgh, and Detroit districts; his headquarters will be at the company's Detroit branch. Mr. Boll for the past three years supervised original equipment tire sales in the Detroit area. During his 20 years with the company he has held many important positions in the replacement sales division, both in the field and general office.

William J. Palmer was made divisional manager for the eastern division. He will supervise activities in the Baltimore, Boston, Buffalo, New York, and Philadelphia districts. He has had 25 years' experience in sales activities for the company, including several managerial positions in the South. His most recent assignment was as district manager for U. S. Tires in Baltimore.

Named as merchandise manager was Curt Muser, who has been manager of retail merchandising activities. Among Mr. Muser's previous sales positions were those of bicycle tires manager, accessory and battery department manager, and merchandise manager of U. S. passenger-car tires.

Sidney R. Milburn succeeds Mr. Muser as manager of the division's retail merchandising department. Before his new appointment Mr. Milburn was manager of the U. S. service merchandising department, one of several sales management positions he has held.

Karl N. Carter was appointed manager of the service merchandising department. Mr. Carter was transferred to New York from Memphis, where he had been district manager for U. S. Tires.

Except for Mr. Boll, the above men will have their headquarters in the company's general offices in Rockefeller Center.

New district managers have been appointed for the New York, Baltimore, and Memphis sales districts of the U. S. Tires division. Harry R. Mack, named New York district manager, has held positions with the company in Buffalo, New York, and Los Angeles, and he recently served as U. S. regional truck tire man-

ager on the Pacific Coast. Wilson O. Green, who recently returned to the company after five years in the army, was appointed manager of the Baltimore district. He had previously been eastern regional truck tire manager and had held several sales positions in Baltimore, Charlotte, and Raleigh. Frederick C. Tucker was named to the Memphis district managership. He has served as U. S. Tires district manager at San Antonio, as fleet sales representative at Atlanta, and has held other sales positions.

James E. Stevenson has been made manager of V-belt sales for U. S. Rubber. For the past seven years he was New York district sales manager of the L. H. Gilmer Co., a division of the rubber company. He began his career with the Gilmer organization in 1934. Mr. Stevenson, a native of Philadelphia, studied mechanical engineering at Drexel Institute.

Appointment of Lynn W. Young as Midwest district sales representative for Sealz, highway joint sealing compound, has been announced by Samuel P. Tauber, sales agent for this product of Naugatuck Chemical. Mr. Young's territory includes Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, Minnesota, Iowa, Missouri, Wisconsin, Illinois, Indiana, Michigan, and Kentucky. He is making his headquarters at 4804 Jefferson St., Kansas City, Mo.

Sealz is a rubber compound used to protect concrete highways by forming a lasting expansion joint between slabs.

Colgate W. Darden, Jr., chancellor of the College of William and Mary, Williamsburg, Va., was elected a director of the rubber company at the board's regular monthly meeting on November 6. He succeeds Lammot du P. Copeland, of Wilmington, Del., a director since 1940.

New Developments

Two textile finishing agents that will give longer life and lasting beauty to clothing were recently introduced to 1,500 representatives of the textile industry by Naugatuck Chemical at the seventeenth annual meeting of the Textile Research Institute in the Waldorf-Astoria Hotel, New York, N. Y. Both finishing agents are milk-like liquids derived from petroleum and coal-tar products. The first, Kandar, gives the manufacturer claims, cloth a lasting crispness or starchiness that resists repeated launderings or dry cleanings without noticeable dulling or wilting. In addition Kandar increases the strength of cloth by 5% to 10% depending on the amount used, with the average cost being half a cent per yard treated. The agent produces its starching effect by bonding the fibers and yarns to themselves, but the bonds may be broken down to give the cloth greater softness by passing it between highly polished rolls.

The other textile agent, named Koloc, reduces the shrinkage of wool from the range of 30-40% to as little as 2% or 3%. This is believed to be the first anti-shrink process that actually increases wool strength. Independent tests have shown Koloc treated fabrics to be approximately 10% stronger than untreated fabrics and to have up to 50% greater abrasion resistance. Both agents do not require a curing step to set them in their permanent form. After dipping into Kandar,

the cloth is passed between squeeze rolls to remove excess liquid and then dried in an oven at 250° F. for one-half to three minutes. Koloc is similarly applied, but dries at a lower temperature and need not be dried immediately. The agents are invisible after application, are insoluble in laundering or dry cleaning solutions, and also protect the fabric against the action of chlorine from bleaching solutions.

The reconditioning time required for an upholstered hotel chair can be reduced from 60 to 75% by the use of foam rubber cushioning material, according to a practical demonstration by Lloyd Jantzen, of U. S. Rubber, at a meeting of the National Executive Housekeepers Association in connection with the National Hotel Exposition in Grand Central Palace, New York, November 12. Reconditioning time for a light armchair can be reduced from an average of 13 hours to less than 3½ hours, by use of the company's Koylon foam rubber. During Mr. Jantzen's address a chair was stripped and reconditioned with Koylon by Fred Hoff, upholsterer at the Henry Hudson Hotel. The complete reupholstering of the hotel chair, from the stripping of the old frame to the finished reupholstered chair, was accomplished in 201 minutes. Hotels buying quantities of particular chair models can save hours in reupholstering time, Mr. Jantzen suggested, by preliminary planning, including prepared patterns for essential parts, precutting of foam rubber, and by assembly-line operations. With a small electric cutting machine developed by U. S. Rubber in cooperation with The Stanley Works, Mr. Jantzen demonstrated the speed and simplicity with which foam rubber may be cut for hotel furniture.

A wire airplane tire designed to carry loads twice as great as today's standard tire was displayed by the company last month at the National Aircraft Show, Cleveland, O. The use of fine, flexible steel wire cord has permitted construction of a smaller airplane tire with a much stronger carcass and consequently greater carrying capacity. The need of such a tire results from the thinner airfoils of super-speed planes which restrict the amount of space for retracted tires. An experimental six-ply 15.50-20 tire on display at the show was designed to carry loads of 20 tons, approximately twice the load carried by the present tire of the same size. While a set of four wire tires of this size would probably permit 80-ton loads, far greater plane loads would be possible with larger-size wire tires. The tire displayed weighed 230 pounds and had a normal air pressure of 250 pounds per square inch, although its developers estimate that it could be inflated to 1,700 pounds before bursting.

The Flintkote Co., 30 Rockefeller Plaza, New York 20, N. Y., through President I. J. Harvey, Jr., has announced that Warren L. McCabe, currently head of the chemical engineering department of Carnegie Institute of Technology, will become the company's director of research on February 1, 1947. Dr. McCabe will succeed John J. Stanko, who has been acting head of the research department and who, for reasons of family health, finds it essential to return to Cali-

Dr. Stanko will continue active in the company's research and product development work, serving as technical director of operations on the Pacific Coast. Mr. Harvey noted that Dr. McCabe's 10 years' experience at Carnegie Tech, preceded by his work in the department of chemical engineering of the University of Michigan, plus his wide contacts with industry as a consultant and his association with the National Defense Research Committee during the war where he worked on chemical warfare problems concerned with gas mask charcoal, well qualify him to head up the company's research and product development work. Dr. McCabe, born in Bay City, Mich., holds a Ph.D. degree in chemical engineering from the University of Michigan and is a director of the American Institute of Chemical Engineering. In addition to many authoritative articles, Dr. McCabe is co-author, with W. L. Badger, of "Elements of Chemical Engineering."



Joseph E. Cox

Hewitt Rubber, Buffalo, N. Y., a division of Hewitt-Robins, Inc., currently is announcing a complete line of foam rubber mattresses and other types of cushioning for hospital and sickroom use. Sold under the trade name Restfoam, the new products already are in production at the Buffalo plant, according to Howard Herbert, manager of Restfoam division sales, who further explained that the supply of liquid latex still is limited and cannot begin to satisfy public demand. However he said Hewitt believes that, since the additional comfort of foam rubber is an aid to speedy recovery, it should be made available first to hospital patients; therefore the company has allocated a substantial share of its present production to supply hospital needs. As the amount of latex becomes more plentiful, the company plans to produce foam rubber mattresses for home use.

Other Hewitt hospital supplies made of foam rubber include ring cushions, wheel chair cushions, operating and inspection table pads, knee rests and utility sheeting, the latter being especially effective as a padding used under casts, splints, and orthopedic braces.

Rohm & Haas Co., Philadelphia, Pa., has named Edward M. Linforth as head of the design section of the model shop at its Bristol, Pa., plant to replace Henry F. Pearson, who resigned to act as an independent design consultant on applications of Plexiglas, to executive edge-lighted murals, and to undertake similar special design problems involving Plexiglas. Mr. Linforth, assistant to Mr. Pearson since November, 1945, attended the University of California. After five years as stage designer and architect he went on to graduate work at Yale School of Fine Arts. For seven years he taught art and architecture at Sweet Briar. His work at Rohm & Haas consists of the design and development of new uses of Plexiglas, with special emphasis on functional applications.

L. Albert & Son, supplier of rubber mill equipment, Akron, O., has promoted William Butcher from superintendent of the company's Trenton, N. J. shops to the position of general manager of its Los Angeles, Calif., plant.

Essex Rubber Co., Trenton, N. J., recently appointed Joseph E. Cox vice president and a director of the company. A native of Kentucky, Mr. Cox was born in 1895 and educated at Southwestern Presbyterian University. He was in the service of the Goodyear Tire & Rubber Co. from July, 1925, until his appointment to Essex. He graduated from the Goodyear flying squadron in 1929 and was subsequently supervisor, foreman, general foreman, and general superintendent of the Windsor, Vt., plant, and most recently assistant general manager of Goodyear's sole and heel division. A member of the Episcopal Church, Rotarians, Masons, and Elks, Mr. Cox is married and has one son, also married.

Hercules Powder Co., Wilmington, Del., has made Henry A. Thouron assistant to the director of sales of the synthetic department, Britt H. Little, director of sales of that department, announced November 8. Mr. Thouron will aid in coordinating the rapidly expanding work of the district sales offices with the central sales offices in Wilmington. He had joined the Hercules naval stores department after graduating from Princeton University in June, 1934. In 1938 he was assigned to rosin sales and technical service work and in 1939 was appointed resident technical representative of the naval stores department in New England, with headquarters at Stoneham, Mass. He enlisted in the artillery in 1940 and was discharged with the rank of lieutenant colonel in December, 1945. Mr. Thouron has been engaged in sales and operations work with the Virginia cellulose department since his return to Hercules in January, 1946.

A. Shrader's Son, Brooklyn, N. Y., manufacturer of pneumatic valves and a division of the Scovill Mfg. Co., has appointed Paul Truncali manager of export sales. During the war Mr. Truncali served the concern as supervisor of allocation; more recently he acted as a special assistant to Sales Manager G. A. Drew. Mr. Truncali holds a law degree from Fordham University and an A.B. degree from New York University.

With the war over, the company plans to increase its service to its customers

in other lands. Local export agents represent Schrader in each Latin American country. A branch in Toronto covers the Canadian market. Other continents are covered through special export agencies, and through Schrader branch offices in England and Australia.

Three additions to its sales force were also announced recently by Schrader's. Arnold C. Carlson has been made district manager of the Minneapolis territory and will cover both North and South Dakota as well as Minnesota. Prior to his service in World War II, Mr. Carlson had extensive experience in the tire and automotive industries. Robert C. Farrar, recently appointed district manager of the Baltimore territory, also comes to Schrader's with considerable sales experience in the tire and automotive field. Richard T. Clements, another veteran of World War II, completed his sales training course at Schrader's Brooklyn headquarters and has traveled extensively through the Lone State with A. E. Fay, the Texas district representative, doing sales promotion work. At present Mr. Clements is obtaining further experience in the Kansas City territory with Mr. Bancroft, who has represented Schrader in that area for many years.

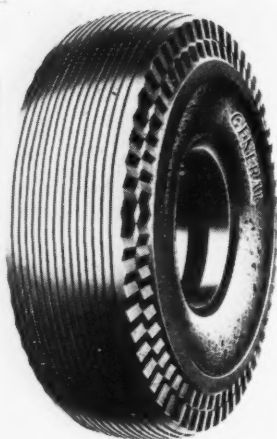
Controllers Institute of America, 1 E. 42nd St., New York 17, N. Y., has announced the election of J. M. Stonnell, comptroller of the Copolymer Corp., Baton Rouge, La., as a vice president of the New Orleans Control of the Institute.

I. B. Kleinert Rubber Co., New York, N. Y., is making serum inoculations available without charge to employees of its College Point, L. I., plant in cooperation with the nationwide effort to hold influenza cases to a minimum this winter. More than 700 workers have requested the inoculations, and the program began November 6 when the first group of 170 employees received the injections. Arrangements are being made to extend this service to the employees in the company's headquarters in New York. The serum recommended is the one perfected and used by the Armed Forces. Before offering this service to its employees, company executives conferred with several leading local doctors, all of whom approved the project as a step to health betterment for the community. In providing this service Kleinert joins the ranks of a score or more of leading companies throughout the country sponsoring similar health measures.

Hugh Burdette, vice president of Cabot Carbon Co., Pampa, Tex., and general manager of the southwestern division of Godfrey L. Cabot, Inc., Boston, Mass., was elected director of the Texas Manufacturers Association at a recent annual meeting held in Dallas.

Pennsylvania Rubber Co., Jeannette, Pa., according to R. B. Cave, vice president in charge of sales, has added Warren C. Berryman to its sales staff to travel the Michigan territory. Mr. Berryman had several years of field sales experience in the tire business before coming to the Pennsylvania Rubber Co.

OHIO



General's Squeegie Premium
Passenger-Car Tire

General Tires Advances Vecsey

William E. Vecsey, for the past nine years manager of Aldora Mills, Barnesville, Ga., textile division of The General Tire & Rubber Co., has been named to direct all the parent company's textile developments, with headquarters at the home office in Akron, according to A. W. Phillips, assistant to C. J. Jahant, vice president in charge of operations, who explained that the move was necessary because of General Tire's recent production and plant expansions.

Mr. Phillips also disclosed that Mr. Vecsey's Aldora duties will be taken over by Leon E. Macomber, whose fabric experience dates back to the Salmon Falls Mfg. Co., one of the original producers of tire fabrics.

Mr. Macomber and Mr. Vecsey first met in the middle Twenties when the former was directing the textile operations of Quitman & Millen, Georgia plants, and Mr. Vecsey was in charge of a similar operation for another major rubber company. The latter has had 32 years of textile experience.

The new Aldora manager's most recent affiliation was as manager of engineering and experimentation for the Pepperell Mfg. Co., Biddeford, Me. From 1928 through 1937 he had served as plant superintendent of the Pepperell operation of 200,000 spindles and 5,000 looms, and he directed 4,200 employees.

Because of his wide experience as project engineer during the building of three General Tire plants, Emil Schnedarek has been selected to handle all industrial and engineering purchasing for the company, R. M. Graham, director of purchases, reported last month. In his new capacity Mr. Schnedarek will headquarter in General Tire's Akron offices, and his duties as Waco plant engineer will be assumed by his present assistant, Thomas M. Campbell. Mr. Schnedarek first went to Waco in 1943 when ground was broken for the erection of the new General Tire plant. Prior to that assignment he had served as project engineer on General's plant constructions at Caracas, Venezuela, and at Poznan and Debica, Poland. He spent three years in Poland, leaving just before the Nazis overran it in 1941.

He had spent a year in Venezuela before taking charge of the Waco project.

The appointment of Ex-Army Captain Paul W. Berry as Kraft engineer for General Tire in the Portland, Ore., district was announced by E. C. Leach, sales manager of special products department. Mr. Berry will assist distributors in the Portland branch area on all phases of tire renewing by the factory controlled Kraft system, which is exclusive with General distributors. He will headquarter in Portland. Previous to his Army service, Mr. Berry worked for General in Cleveland, Philadelphia, Oakland, and San Francisco.

A leave-of absence for A. H. Faull, Jr., technical superintendent of General's synthetic rubber division at Baytown, Tex., has been announced by Ted Lyman, general manager. Dr. Faull will serve two years in scientific research as civilian director of the Boston branch of the Scientific Section of the Office of Research and Inventions of the U. S. Navy. The new assignment will permit Dr. Faull to continue in an advisory capacity for General and act as company representative on the Polymer Development Committee sponsored by the RFC.

J. C. McGiffen, acting technical superintendent, will assume Dr. Faull's duties and also continue as representative on the Subcommittee on Process Improvements. J. L. Hutson has been appointed to the Subcommittee on Specifications and Test Methods, sponsored by the RFC.

Improved Tire Returns

Days of the wartime 35-mile-per-hour passenger-car tire are definitely over, according to L. A. McQueen, General Tire vice president in charge of sales, who said the rubber industry has fought strenuously since the war's end to obtain governmental permission to produce a tire capable of answering the motorist's challenge. The production of a tire with a greater factor of safety is now possible under the revised R-1 CPA regulation which permits the use of greater percentages of natural rubber in the manufacture of all passenger tires.

"We now are able to return the premium Squeegie tires to our line," said Mr. McQueen, "and these tires have a proven factor of safety that will meet the motorist's challenge, I am sure."

In recent running tests in and around San Bernardino, Calif., the Squeegie tires greatly exceeded the wartime Silent Grip tires in tread wear, and the carcass of the premium tires have more than met the requirements of the company's exact-

ing technicians. It is generally recognized that driving conditions in the San Bernardino Valley are very difficult, and the test cars were run constantly at 60 miles per hour, with the drivers operating on eight-hour shifts. The General designers have greatly strengthened the carcass of all the cross-sections to afford the tire greater tread and carcass serviceability.

"Our tests show that the strength of the body in some of our Squeegie tires is 35% greater than in the wartime Silent Grip," Mr. McQueen declared.

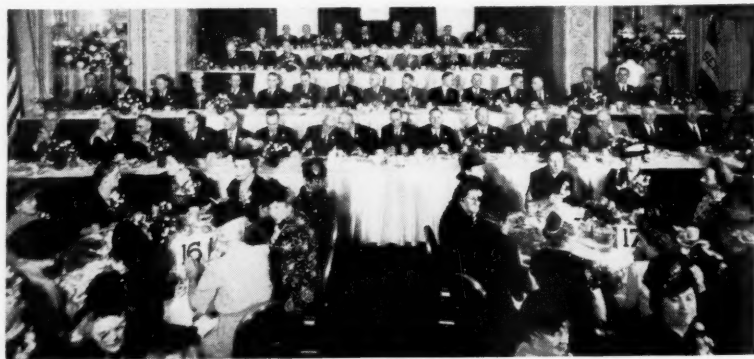
Seiberling Anniversary

An important milestone in rubber history was marked last month with the observance of the twenty-fifth anniversary of the founding of Seiberling Rubber Co., Akron. On November 16 pioneer employees associated with the company since its founding in 1921 gathered for a banquet at Akron's Hotel Mayflower and heard short addresses by company officials, including J. P. Seiberling, president, and F. A. Seiberling, 87-year-old chairman of the board and original founder. The same "charter members" were then honored guests at a Silver Anniversary Pageant, held at Akron Armory and attended by all company employees and their families. Produced professionally by the Jam Handy Co., Detroit, with a large cast of players, the pageant portrayed the history and growth of the company. Four performances of the pageant were given to accommodate all employees, members of Akron civic organizations, and the public. Employees with 25 years of service were presented with commemorative plaques marking the occasion.

Begun during a depression in 1921 with an idle factory at Barberton, and a handful of capital, Seiberling has grown until today it has an annual sales rate of \$30,000,000, a national and international sales organization with branches from coast to coast, and plants in Barberton and Toronto, Ont., Canada.

Noticeably absent at the ceremonies was C. W. Seiberling, brother of F. A. Seiberling and co-founder of the company, who died September 20 at the age of 85, less than two months before the company reached its 25th birthday.

Members of the Seiberling Silver Anniversary Committee making plans for the commemoration included F. A. and J. P. Seiberling; H. P. Schrank, vice president in charge of production; J. L.



First Picture of the Seiberling 25-Year Club, Taken November 16, When the Company Celebrated Its Silver Anniversary

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Cochrun, vice president in charge of sales; R. J. Thomas, vice president and treasurer; C. E. Jones, vice president and comptroller; W. P. Seiberling, secretary; L. M. Seiberling, general sales manager; G. N. Kinkead, Akron district manager; G. F. Weisenbach, advertising and merchandising director; E. H. Cook, advertising manager; W. H. Oburn, credit manager; Tom Buchanan, publications director; and Douglas Mueller, director of public relations. Charles A. Reed, assistant to the president and himself a 25-year employee, was chairman of the committee.

Quarter-century employees, who formed the 25-Year Club at this time, during the festivities received silver plaques, checks for \$250 each, and two weeks' extra vacation with pay. F. A. Seiberling is first member of the new club, which welcomed 54 original employees into the fold.

For Better Farm Tires

Through the efforts of a staff of research and development men, and two crews of experienced tractor operators, on the test course at the Homestead Farms, Columbiana, of Firestone Tire & Rubber Co., Akron, farmers are benefiting much sooner from new developments in tractor tire design and construction. Rolling steadily over a two-mile dirt and crushed stone road bed studded with more than a dozen concrete, stone, and timber obstacles, six test tractors and their drags punish tires 16 hours a day, six days a week. The drags, rebuilt and heavily weighted tractors with dead motors which are pulled in gear, provide resistance corresponding to the normal "load" of a farm tractor in actual field operation. In this way tires within two weeks can be subjected to the equivalent of a year of normal farm service. Surrounding the course are eight test fields which range in surface cover from sod and alfalfa to mud and loose soil, where other tractors, attached to dynamometer trucks equipped with the latest measuring instruments, put tires through field trials similar to actual farm operation. These tests provide accurate data on the relative abilities of various types of tires in providing pulling power and cleaning. These tests played an important role in the development of Firestone's recently announced Champion Ground Grip tire.

Firestone has obtained CPA approval for the construction of a new shop building at 2525 Firestone Blvd., Los Angeles, a quonset-type structure to cost \$6,800, of a service and storage room at 116 E. Lime St., Monrovia, Calif., a steel frame and corrugated iron structure 24 by 48 feet to cost \$4,000.

G & A Aircraft, Inc., Willow Grove, Pa., has changed its name to Firestone Aircraft Co., with Roger S. Firestone as president. G & A, formerly the Pittcairn Autogiro Co., was acquired by Firestone Tire & Rubber in 1943. At that time it was producing CG-4A gliders and experimental autogiros. After purchase by Firestone, it developed and produced the XR-9 and XR-9B helicopters for the Army Air Forces, and the commercial version of this helicopter, known as the GA-45. The plant, in addition to helicopter construction and development, is now producing aircraft wheels and brakes and SuperFlex undercarriages.

Factory in Africa Ready; Goodyear's New Appointments

Goodyear Tire & Rubber Co., Akron, expects production to get under way in January at its new tire and mechanical goods plant in Uitenhage, South Africa, where the buildings have been completed, and equipment is being installed. The main factory building, 900 feet long, will house tire and tube manufacturing facilities; while a separate mechanical goods unit measures 300 by 100 feet. Production will be geared to the South African market, and the new plant will employ about 500 workers at the start.

Among officials assigned to this overseas post are: V. L. Follo, general superintendent; N. A. Nigolian, chief engineer; Fred B. Conrad, Division "A" superintendent; Eldred L. Stanley, Division "B" superintendent; A. F. Novick, Division "C" superintendent; and Harold Wilson, technical superintendent. Mr. Follo had been general superintendent at the company's factory at Norrköping, Sweden, from 1938 to 1942, when he was returned to Akron as production superintendent of Goodyear Aircraft Plant D; then later he was made general superintendent of the plant; he has been with the company 26 years. Mr. Nigolian, a 30-year veteran, as a member of Goodyear's engineering staff, has held posts at the company's plants in England, Mexico, Colombia, Venezuela, and Cuba. Mr. Conrad, who joined the company in 1934, recently returned from the Los Angeles plant, where he had been a general foreman since 1944. Mr. Wilson has spent his 18 years with the company in development and from 1937 to 1941 was a compounder at the Jackson, Mich., plant and later was made chief chemist there. Mr. Stanley, who began 20 years ago as a tire builder, advanced to supervision, holding posts throughout the tire division; but in 1942 he was transferred to Aircraft Plant D where he was general foreman of the Corsair flight hangar until his return to Goodyear Tire last year. Mr. Novick, who will head up mechanical goods production, came to Goodyear in 1928 and served in Argentina (1930-32); in Windsor, Vt., as night superintendent from 1936 to 1938; in Sweden as Division "C" superintendent from 1938 until 1940; and in the Charlestown, Ind., powder bagging plant from 1941 to 1945 as assistant plant superintendent.

Eighteen men also are going to South Africa on temporary labor training assignments. They are: P. Blazer, head room; H. Brownlee, pit operations; J. R. Hawkins, production control; C. Mettler, mechanical goods design; R. G. May, hose; W. A. Miller, airbags and final inspection; C. O. McKirrick, stock preparation; W. E. Musselman and D. A. Stivers, laboratory testing; D. M. Pugh, calenders; J. W. Samples, belts; G. P. Shaw, mill room compounding; R. Stoltz, passenger tires; S. G. Baker, tubes and flaps; G. A. McGregor, truck tires; R. McLean, mills and calenders; S. Fordham, tubing machines; L. D. Riess, compounder.

Already on the job at South Africa are: R. B. Willett, personnel manager; F. F. Silver, manager technical service; Henry Watts, purchasing agent; and H. A. Brundage, manager of cost accounting.

Louis D. Hochberg, prewar superintendent of Goodyear's factory in Buitenzorg, Java, left Akron on November 4

on an inspection tour of the company's holdings in the Far East. This is his second trip to Java since the war ended. Mr. Hochberg was forced to flee Java by the invading Japanese early in 1942. Returning immediately after V-J Day, he found the Goodyear factory still intact. It had been operated by the Japanese during the war, but is now idle. Opened in 1935, this factory is the only tire plant in Netherlands India. Traveling to Java by plane, Mr. Hochberg stopped enroute to visit the company's plant in Sydney, Australia.

Many Personnel Changes Reported

Appointment of L. B. Sebrell as director of research and chemical products development at Goodyear was announced last month by Vice President Dinsmore. In the change which permits more effective coordination of the work of these two divisions and provides for the better utilization of facilities and personnel, Dr. Sebrell will be directly responsible to Dr. Dinsmore. H. Judson Osterhof has been made manager of the research department; while C. W. Walton continues as manager of the chemical products division, both of whom report to Dr. Sebrell.

Appointed assistant manager of research are: A. M. Clifford, in charge of basic raw materials research activities; H. A. Endres, in charge of chemical products research, and J. A. Merrill, in charge of mechanisms and processes research; all of these men are responsible to Dr. Osterhof.

I. D. Patterson has been named assistant manager of chemical products development.

Twenty-two section heads of the research and development organization on various phases of the work of the laboratory, ranging from organic intermediates and rubber chemicals through polymer research, resins, rubbers, rubber and plastics compounding, microscopy to metallurgy, and analytical laboratories are included in the new staff arrangement.

Dr. Sebrell, who joined Goodyear after serving with the Chemical Warfare Service of the United States Army at Washington in World War I and with the Case School of Applied Science, Cleveland, as instructor, has been head of Goodyear research for 17 years and has pioneered in the development and use of rayon for tires and is known for his work on accelerators, including the invention of Captax. Development of Pliofilm and Pliolite and pioneer work in synthetic rubber have been under his direction. Graduate of Mt. Union College, he did post-graduate work in the universities of Wisconsin and Ohio State. He is a member of the American Chemical Society, the American Institute of Chemical Engineers, and the Chemists' Club of New York.

Dr. Osterhof, a native of Greenleaf, Minn., is a graduate of Hope College, Mich., and attended the University of Michigan from 1921 to 1928, where he obtained his B.S., M.S. and Ph.D. degrees. He is also a member of the American Chemical Society.

Dr. Walton, who comes from Carlinville, Ill., is a graduate of the universities of Michigan and of Illinois. He has been with Goodyear since 1933. During the war he served as a liaison man with the Rubber Reserve Corp. and other rubber companies on the synthetic rubber program.

James A. Loder has been made manager of commercial sales for Goodyear to succeed the late E. R. Preston. Mr. Loder, who is a native of Stroudsburg, Pa., and attended the University of Pennsylvania, started with the company as a salesman at Philadelphia in 1926 and was appointed general-line salesman at Harrisburg in 1937, then was transferred to truck tire sales in that city two years later. In 1941 he returned to Philadelphia, where he was made field representative for truck tire sales in 1943. Transferred to Akron as senior staffman in commercial sales in 1945, he continued in that capacity until his new assignment.

Jack D. Porter, Goodyear's public relations staffman since his return from military service in February, 1946, has been named manager of airship advertising. J. K. Hough, director of advertising for the company, announced last month. Mr. Porter, who attended Akron University, first joined Goodyear in January, 1929, and in January, 1935, began training on the production squadron. In June, 1937, he was assigned to public relations on the staff of the Akron *Wingfoot Clan*, but was transferred to the public relations staff in October, 1940. Next he was assigned to the Goodyear Engineering Corp., Charlestown, Ind., in July, 1942, where he served as public relations manager for the wartime powder bag loading plant. In December, 1943, he entered the Armed Forces. In his new assignment Mr. Porter will be in charge of making all arrangements for operations of Goodyear's airships, which are being used in extensive Goodyear advertising activities from coast to coast.

Appointment of Charles O. Roome, as manager of the St. Louis district heads a series of field personnel changes in the company's mechanical goods division. He had been a member of Goodyear's sales staff in New Orleans since 1937. A native of New Orleans, he studied engineering at Columbia University and is a member of the Louisiana Engineering Society.

John E. Ragan, manager of the St. Louis district since 1935, has transferred to Atlanta as district manager of mechanical goods sales. Philip C. Antoine becomes field representative at New Orleans, transferring from a similar position at Memphis, Tenn.; while Richard P. Goodenough assumes the latter post. Charles H. Murtaugh has been named field representative at South Bend, Ind., replacing Gerald W. Zolman, who returns to Chicago as a field representative; and Carl Baker becomes field representative at Charlotte, N. C. Robert J. Ario is now field representative at Cleveland, having moved from Orlando, Fla., where he was succeeded by William R. Burtle. The latter was transferred from the company's sales staff in Philadelphia, and his place there taken by Robert C. Alexander, who served as an engineer for Goodyear Aircraft Corp. during the war.

Philip X. Navin has been made field engineer for the New York district, a new post in the district field organization. Mr. Navin will supplement the work of the company engineers in Akron, aiding mechanical goods field representatives in obtaining technical on-the-job data and supervising the installation of conveyor belt systems and other industrial equipment. His headquarters will be in New York City. A native of Boston and a graduate of Northeastern University, Mr. Navin has been with Goodyear since 1943, starting in Akron as an engineer for Goodyear Aircraft. His district engineer-

ing post is the third of a series being established; other specialists are stationed in Atlanta, Ga., and Dallas, Tex.

George G. Kerr has been appointed to the newly created position of sales manager for Goodyear's shoe products division; he had previously been manager of sales to the renewal market. Mr. Kerr came to the company in 1927, following graduation from Wooster College. He has been affiliated with the shoe products division since September, 1936.

Frank Evans, formerly manager of factory sales and service at the company's shoe products factory in Windsor, Vt., becomes production manager for the entire shoe products division. His new duties will include contact with all other plants where shoe products are manufactured. A Goodyear employee for 20 years, Mr. Evans worked in production control for ten years, three of which were at the company's plant in Australia. He was transferred to Windsor in October, 1936, as purchasing agent and superintendent.

Named to the position of plant manager at Windsor is William L. Hall, who had been elevated to division superintendent in 1936 and then production superintendent early this year. Both personnel and engineering now come under his supervision. Mr. Hall's service with the company dates from July, 1925. He was on supervision at the Akron plant until his transfer to shoe products in 1936.

The shoe products' original equipment division, under the supervision of A. J. Kayser, is being expanded to meet demands for increased production, details of which will be announced later. Mr. Kayser attended the University of Missouri before joining the company in November, 1919. His entire service has been in the sales division.

Return of Ivan C. Alspach to Akron as manager of mechanical goods for Goodyear Tire & Rubber Export Co., has been announced. Since 1944 he had been the company's mechanical goods representative for the Atlantic Seaboard, with headquarters in New York. Succeeding him there is William H. Klippert, a member of the company's mechanical goods sales staff since 1944.

A native of Delaware, Mr. Alspach joined Goodyear in Akron as a tire builder in 1927. Later he transferred to the accounting division and in 1934 was made sales manager of Goodyear's subsidiary, the Wheeling Township Coal Co., Adena, O. He joined Goodyear Export in 1944. Mr. Alspach attended the University of Akron.

Three Goodyear Tire men have returned to the company's Akron organization after 16 to 20 years' service in Sydney, Australia: Alvin J. Slay, purchasing agent for 20 years at Goodyear's Australia plant; Melville W. Mears, division superintendent of the factory for 16 years; and Charles H. Maxwell, who also was there 16 years in charge of industrial rubber products. The three have received new posts in Akron. Mr. Slay, who joined Goodyear in 1913, has been assigned to special work in the company's engineering division; while Mr. Mears has been assigned to tube manufacturing; he has been with the company since 1926. Mr. Maxwell, a 20-year man, has been made development manager of Goodyear's Airfoam division.

Appointment of H. S. Quackenbush and C. B. Quillian as Goodyear sales representatives at San Francisco, Calif., and Seattle, Wash., respectively, was recently announced by the company in connection

with the expansion of its sales organization on the West Coast. Establishment of sales offices in these cities is a result of the increasing importance of original equipment operations in the far west, according to J. M. Linforth, company vice president, and supplements a Goodyear expansion policy previously inaugurated with the naming of new sales personnel at Los Angeles. Previously farm tire representative in San Francisco, Mr. Quackenbush has been associated with Goodyear for the last 28 years, being a member of the sales organization during most of that time. Mr. Quillian started with Goodyear as a salesman in 1940 and, previous to this new appointment, had been manager of fuel tank sales in the aviation products division at Akron.

Presentation of a citation from Army Ordnance for outstanding engineering service rendered during war years was made to C. R. Case, Goodyear off-the-road tire design manager, by President E. J. Thomas at a recent meeting of the company's board of directors. Bearing the signatures of Secretary of War Robert P. Patterson and Lt. General L. H. Campbell, Jr., chief of Ordnance, the citation read, "The War Department expresses its appreciation for patriotic service in a position of trust and responsibility." Prior to the presentation, officers and directors of the company heard the recipient give an interesting résumé of the development of earth mover tires and their many applications. Mr. Case was resident engineer for Goodyear in Washington from 1942 until the end of the war. He worked closely with the research and development divisions of the Ordnance department on application of new types and sizes of tires for military use. In constant touch with operations in Akron, he made recommendations for development and construction of tires for the Army's special equipment.

R. P. Dinsmore, Goodyear vice president in charge of research and development, was recently elected a trustee of the Midwest Research Institute, Kansas City, Mo. An impartial advisory body organized for the purpose of serving both industry and agriculture by helping small manufacturers, business men, and farmers to keep abreast of large industry in the field of scientific research, the Institute is one of four organizations of its kind now operating in the United States and the only one west of Chicago. Now in its second year of existence, the Institute is specifically intended to cope with post-war scientific problems, serves a large midwestern and southwestern area, and is actively supported. Facilities offered include the advantages of unequalled research equipment, together with a staff of able scientists. A technological library has already been built up. The Institute is established on a non-profit basis, and individuals who sponsor certain projects receive patent protection, and work is carried out in confidence. Designed primarily to help the little business that cannot afford its own laboratory and staff, the Institute undertakes services which benefit the greatest number of small communities. On the basis of a survey of regional needs, the Institute will follow six lines of scientific inquiry, including organic, inorganic and agricultural chemistry, applied physics, and chemical and mechanical engineering. At the same time, observing the increasing use of farm products in industry, the Institute is giving chemurgy, that branch of industrial chemistry correlating the farm and the factory, a leading part in its program.

Veteran employees whose long service was recently recognized by the company include J. H. Blakeney, district sales manager at Dallas, and Clement F. Taylor, mechanical goods representative covering metropolitan St. Louis, both of whom completed 30 years with Goodyear; and F. Jasper Blake, shoe factory representative in New England, with four decades.

Robert C. Schaffner, a director of the Goodyear company since 1921, died November 13 after a long illness at Michael Reese Hospital, Chicago, Ill. Mr. Schaffner was born July 6, 1876, in Chicago and was educated in that city's public schools and the South Side Academy. He was chairman of the board and director of the A. G. Becker & Co., Inc., investment banker in Chicago and New York, and was also a director of the Hammernill Paper Co., Penick & Ford, Ltd., and Valley Mould & Iron Corp.

Windsor Factory Fete

Among the highlights of a joint community-industry celebration at Windsor, Vt., on November 21, observing the tenth anniversary of the Windsor Mfg. Corp., shoe products division subsidiary of Goodyear, was the announcement by F. R. Evans, production manager of the division, that the plant had made more than 450,000,000 pairs of rubber and Neolite heels in the decade of its existence. The plant has worked 10 continuous years without an interruption of any kind. He further stated that 75,000,000 pairs of rubber and Neolite soles and more than 1,200,000 gallons of cement for shoemaking purposes had been produced by the plant. It was also revealed that the plant manufactured all the soles and heels for army ski boots, and all of the rubber heels for army paratroop boots used during the war, in addition to essential civilian production.

E. J. Thomas, Goodyear president, and other executives from Akron were on hand at the celebration. Accompanying Mr. Thomas were Cliff Slusser, vice president in charge of production; W. S. Wolfe, factory manager; F. W. Climer, assistant to the president; Herman E. Morse, manager of mechanical goods development; Harry L. Post, manager of shoe products division; L. A. Hurley, manager of interplant relations; and L. E. Judd, director of public relations.

Windsor businessmen were hosts to plant and visiting officials at a luncheon; open house was observed at the factory where a special exhibit of rubber products was open to townspeople; the factory was host to local businessmen at a dinner, with 41 ten-year employees as special honor guests; and a dance for employees and townspeople concluded the day's events. Company program events were under the direction of Mr. Evans, assisted by W. L. Hall, plant manager; W. E. Kavenagh, development manager; F. E. Joel, chief engineer; W. S. Edsall, chief chemist; H. L. Leigh, works accountant; and Harvey Hutchins, personnel manager.

Report on Recent Products

Announcement of a complete new line of truck tires to be known as the Road Lug, designed and developed for combination off-the-road and highway service, has been made by W. A. Kemmel, company manager of truck tire sales. Production of the Road Lug tire in sizes 7.00-20 through 12.00-24 has begun, and sizes 13.00-24 and 14.00-24 will ultimately be

made available. The new tire is particularly suitable for use in such services as logging, quarrying, and strip mining under conditions where heavy loads must be hauled out on rocky, rutty, or stump obstructed roads to surfaced highways for long hauls to ultimate destinations. The tire is claimed capable of resisting cutting and bruising, providing traction in soggy going, and delivering exceptional mileage on improved highways. The tires are constructed with a rayon cord carcass; tread and sidewalls with natural rubber content equal to prewar tires of the same size; extra-heavy layers of cushion rubber between plies; and extra-heavy rayon breaker. All sizes have multiple beads of high carbon steel wire.

One of the largest tires ever manufactured has been turned out by Goodyear for the Army Air Corps' six-engine super-bomber, the XB-36, which Consolidated-Vultee Aircraft Corp. built and tested recently at Fort Worth, Tex. The XB-36 tire has 34 plies, an overall diameter of 110 inches, and measures 44 inches across the beads and 36 inches from one sidewall to the other. Each Goodyear unit, comprising tire, tube, wheel, and brakes, weighs 4,000 pounds.

The frozen food industry's need of a practical packaging material of low moisture transmission rate and high flexibility at extremely low temperatures was offered fulfillment by FF Pliofilm at the Fourth All-Industry Refrigeration & Air Conditioning Exposition, held in Cleveland on October 29 to November 1. A drawing card at the Pliofilm exhibit was a continuous deep freeze packaging demonstration, approved by the Ohio State University Plant Locker School and performed by graduate students, Dorothy Culler and Lowell Strong, which showed that with FF Pliofilm, fresh food could be wrapped, sealed, and placed into a deep freeze with minimum effort and maximum speed. Open freezers at the exhibit filled with Pliofilm wrapped foods gave proof of the material's ability to withstand aging, prevent refrigerator burn, and control moisture content.

An incentive program for speeding up ownership, and addition of 960 acres of land, mark two distinct steps forward for the agricultural project being carried out by P. W. Litchfield, Goodyear board chairman, at the Goodyear Farms, Litchfield Park, Ariz. Benefitting from experiences of the past nine years, the project's governing board announced a plan whereby individual ability to assume responsibility will receive greater recognition, in place of promotions being previously given on a yearly basis. An additional 1½ sections of land has been prepared, and 13 more 80-acre farms will be available by the time housing facilities are ready for occupancy. In this project Goodyear furnishes land at a fair value, training, and capital, while the apprentice farmer furnishes labor. The plan selects young men of agricultural background with limited opportunity of becoming independent farmers, trains them in sound methods of farm operation, and brings them by successively more responsible stages to complete farm ownership. Tom Greenfield is agricultural supervisor, and of the 26 apprentice farmers two have already assumed complete ownership of their farms.

Hydraulic Press Mfg. Co., Mt. Gilead, has made H. J. Leisenheimer director of

export sales, according to President H. A. Toulmin, Jr. Mr. Leisenheimer has assumed direction of a broadly expanded program of foreign distribution of the company's line of self-contained hydraulic machines for metal forming, forging, die casting, plastics molding, and other pressure processing. A native of Cleveland, Mr. Leisenheimer was formerly executive vice president of Cleveland Tractor Co., specializing in the development of foreign trade. He is a member of the Export Managers' Club of New York and also the National Foreign Trade Council.

Norman C. Hill, for the past six years director of research and development for Pittsburgh Coke & Chemical Co., recently was made chief chemist of the Government Synthetic Rubber Laboratory at Akron.

Timken Appointments

The Timken Roller Bearing Co., Canton 6, has appointed H. B. Lilley a district manager of the steel and tube division, with headquarters in Houston, Tex., and covering Texas, Louisiana, Arkansas, Oklahoma, and Kansas. Mr. Lilley, with the company since February, 1925, following his graduation from Carnegie Institute of Technology in 1924, has served in the inspection engineering department of the steel and tube division and in the steel sales department, and most recently had been developing engineer on alloy mechanical tubing. He is also an active member of the American Iron & Steel Industry.

Elmer Anderson, service engineer in Timken's Milwaukee office, has been appointed assistant service manager of the Canton office. Graduated from the University of Wisconsin in 1929 with a B.S. degree, Mr. Anderson joined the company's engineering staff in February, 1929. From that post he went to Milwaukee, where he was made service engineer in 1933.

Leland S. Steiner, assistant superintendent of maintenance for Timken's steel and tube division, has been elected a director of the Association of Iron & Steel Engineers for 1947. Mr. Steiner started with Timken on June 1, 1925, in the electrical department of the steel and tube division and was promoted to superintendent of the department, July 19, 1938. On February 16, 1945, he received his promotion to assistant superintendent of maintenance.

Martin Fleischmann, metallurgical engineer of the steel and tube division, has been awarded an honorable mention certificate in the first annual Material and Methods Award for outstanding achievements in applying war-born knowledge of materials and their processing to the manufacture of peacetime products. Mr. Fleischmann and his associates in the steel and tube division received the award "for the development of '16-26-6' alloy, used during the war in gas turbine and turbo-superchargers and now being applied in several high-temperature peacetime products." Mr. Fleischmann received his framed certificate at a special presentation dinner given at the Hotel Claridge in Atlantic City, N. J., November 20, during the National Metal Congress & Exposition.

Goodrich to Build Tire Plant in Peru

Announcement was made November 4 that The B. F. Goodrich Co., Akron, has completed arrangements with Peruvian interests for the construction of a tire and tube factory in Lima, Peru, to be completed late in 1947. This new plant will have an annual capacity of about 50,000 tires and tubes. Goodrich will provide all technical and engineering services. Increased transportation facilities and a rapidly expanding road system in Peru will provide a growing market for tire and tubes produced in that country, according to Goodrich officials.

Personnel Promoted

Herman V. Gaertner, assistant treasurer at Goodrich, has been elected controller of the company to succeed T. B. Tomkinson, who retires on December 31. Mr. Gaertner, appointed assistant controller in 1929 and assistant treasurer in 1943, joined Goodrich in 1916 as a clerk in the accounting division following his graduation from the University of Wisconsin. In 1925 he was placed in charge of the company's traveling auditors and named budget supervisor. The following year he became assistant auditor and assistant controller three years later. Mr. Gaertner was born in Madison, Wis. He is married.

Revision of the territorial organization of Goodrich's replacement tire sales division into five divisions instead of four, and appointments of five sales executives in connection with the changes were announced last month by Guy Gundaker, Jr., field sales manager. Changes follow the recent death of Charles A. McGill, manager of the central division.

L. T. Greiner has been made manager of the fifth territorial area, the southwestern division, comprising the Dallas, Houston, Kansas City, Oklahoma City, Omaha, and St. Louis districts, all formerly in the central division. Headquarters will be in Oklahoma City. Mr. Greiner had been manager of the Oklahoma City district since it was established 18 months ago. With the company since 1929, he has held a variety of executive posts in sales promotion, advertising, and sales.

A. C. Kelly is the new manager of the central division, succeeding Mr. McGill. His territory now comprises the Chicago, Indianapolis, and Minneapolis districts, which were in the central division, Cincinnati, formerly in the southern division, and Cleveland and Detroit, previously in the eastern division. Headquarters will be in Chicago. Mr. Kelly had been manager of the Chicago district since 1933 and with the company 31 years, most of that time in the Chicago area, except for three years as manager of truck and bus tires sales at Akron headquarters.

Hugh Reichert, manager of the Buffalo district since 1943, succeeds Mr. Kelly at Chicago, and George R. Empson is new manager of the Buffalo district. Hoyt Price has been named manager of the Oklahoma City district. Mr. Reichert joined Goodrich in 1934 and handled battery and accessory sales in the Chicago, Minneapolis, and Milwaukee territories for several years. Mr. Empson came to the company in 1930, was credit and operating manager in several districts, and entered the sales field as wholesale, and later sales supervisor in the Washington district. He had been general supervisor in the Boston district since 1943. Mr. Price started with Goodrich in 1927 as a

tire salesman, became a store manager, and has held other sales posts. He goes to his new assignment after serving as general supervisor in the Memphis district for the last year.

New Products Developed

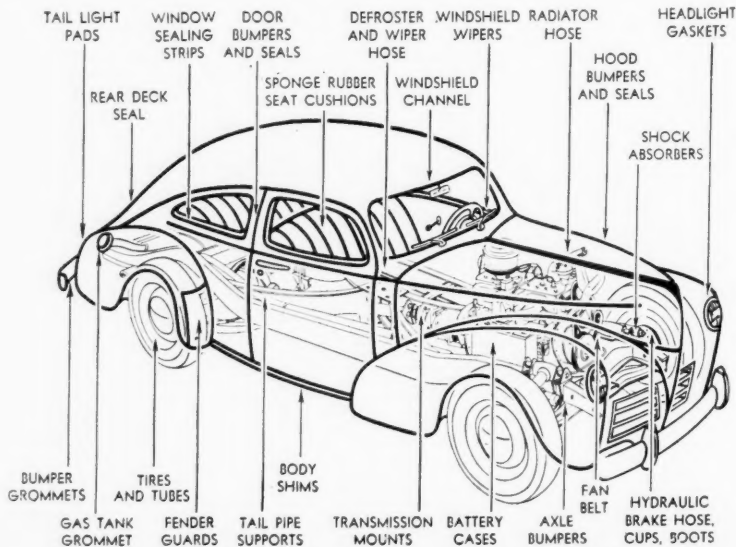
Koroseal cordage has been announced by Goodrich for use in industrial applications or as clothesline. Made with 19 strands of low-stretch cord rayon with high tensile strength, and jacketed with a generous coating of white Koroseal, the product is claimed to have all the good characteristics of the best quality cotton cordage of 0.0150-inch diameter, plus a number of other advantages, including: tensile strength of 150-200 pounds; non-kinking and non-twisting; wipes clean with damp cloth; not necessary to take down; remarkable resistance to abrasion; no reduction in tensile after 200 hours' water spray and weathering test at 125° F.; no significant change in characteristics after oven test at 48° F. for 48 hours; very slight shrinkage in water boiling test of 24 hours; withstands sub-zero weather if not abruptly kinked; ties and knots same as cotton cord; takes standard clothespins; and jacket withstands clinching or bending pressure with all types of hooks or fasteners. The product is merchandised in 50-foot hanks, with 12 hanks to a box, and 12 boxes to a shipping section. Hanks are continuous and connected so that the retailer can sell one or more at a time.

An indication of the plastics consciousness of the American public is given in the unexpectedly heavy demand for the Koroseal clothesline. During the first 10 days following the formal announcement that the product was available, the company sold 10 million feet. One Akron store alone took a half-million feet, sight unseen; while an Atlanta, Ga., outlet similarly bought a million feet.

A new development of planetary motion in which two standard cross-section V-belts and four variable pitch

pulleys provide infinite ratio, stepless speeds from full down through zero and into full reverse at constant torque of two-horsepower capacity, has been jointly announced by Goodrich and by Speed Selector, Inc., Cleveland. The latter company designed and developed the new control, known as the Variable-V-Planetary Speed Selector; while Goodrich will merchandise the product along with its transmission lines. In operation, the Variable-V-Planetary Selector system compares the ratios of two V-belt drives and applies the difference in speed to output shafts. Speeds from 400 r.p.m. to zero, forward and reverse, can be obtained. Advantages cited are: increased production by providing correct speed for each job, high efficiency, constant torque, infinite speed ratios in either direction, speed changes by finger-tip control without stopping the machine, ready installation in many positions, sturdy construction, ready adaptability for designs into new equipment, and space saving through compact design using standard motors with remote control if desired. Suggested machine applications include agitators, calenders, conveyers, cookers, drill presses, grinders, hoists, mixers, process machinery, and pumps.

One of the largest single conveyor belts ever made has been produced by Goodrich for one of the important users of this product. Of the cord conveyor belt design which the company features, the belting consists of 5,100 feet of 48-inch, five-ply belt, and weighs about 72,000 pounds. The belting forms a roll having an outside diameter of 25 feet. The complete belt contains approximately 1,750 pounds of cotton in its construction. To shut down the conveyor system on which the belt will operate for the shortest possible time, six lengths in which the belt had been constructed were spliced together at the customer's plant. A special frame and windup were built at the installation point so that when the time comes for changing belts, the new one will be fastened to the end of the old belt, pulled over the pulleys, and spliced endless on the job. A shelter will be built over the belt to protect it from the weather.



Prepared by The B. F. Goodrich Company

Sketch Showing 23 Rubber Applications in New Cars

MIDWEST

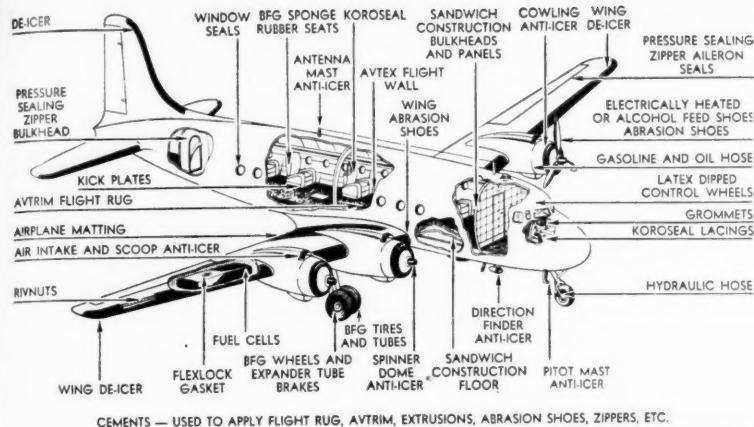
Monsanto Appointments

Monsanto Chemical Co., St. Louis, Mo., has transferred Assistant Treasurer Edwin J. Putzell, Jr., to the legal department as assistant secretary of the company. Mr. Putzell joined Monsanto last year and served both as assistant treasurer and for a time as assistant to Charles A. Thomas, vice president and research director. As assistant to Dr. Thomas, he worked in liaison with atomic energy operations at the Oak Ridge, Tenn., Clinton Laboratories, operated by Monsanto under contract to the Manhattan District. Mr. Putzell served during the war as executive officer of the Office of Strategic Services and later as assistant to OSS Director Maj. Gen. William J. Donovan. A native of Birmingham, Ala., Mr. Putzell attended grade and high schools at New Orleans, La., and later was graduated from Tulane University and Harvard Law School.

John L. Gillis, former general export manager and assistant director of the foreign department, has been made head of the foreign department, succeeding Arnold H. Smith, now representative of the executive committee to consolidate the interests of Monsanto in Australia, where the company operates two plants in Melbourne, and a third in Brisbane, which is operated by Laucks Australia Pty. Ltd., a Monsanto subsidiary. Mr. Gillis joined Monsanto in 1933, but left the company in 1944 to become vice president of Johnson & Johnson International, New Brunswick, N. J. He returned to the Monsanto foreign department last September. Mr. Smith joined the company in 1922 in the Rubber Service Laboratories at Akron, O., and served as research chemist, salesman, assistant sales manager, and finally as technical sales manager. He worked for Monsanto in England from 1930 to 1940, was petroleum chemicals sales manager in St. Louis for the next four years, and became director of the foreign department in October, 1945.

A reorganization of the New England sales territory of Monsanto's plastics division, Springfield, Mass., was recently announced by F. A. Abbiati, general manager of sales. In northern New England, sales of thermosetting molding materials will be handled by J. Douglass Kirk; while Winston Richter, who formerly handled both thermosetting and thermoplastic materials, will devote his efforts entirely to the sale of thermoplastic materials. In southern New England the sale of thermoplastic materials has been assigned to William H. Face, and thermosetting materials to T. J. Martin. Mr. Martin formerly handled both types of plastics sales. This realignment of duties, Mr. Abbiati said, was occasioned by Monsanto's expansion program.

Appointment of Edwin L. Hobson as assistant branch manager of the New York office of the plastics division also was recently announced by Mr. Abbiati. Mr. Hobson will report to C. R. Reeves, manager of the office at 30 Rockefeller Plaza, New York, N. Y. During the war Mr. Hobson was a lieutenant colonel, assigned to the Quartermaster General Office. He was plastics section chief of the military planning division's research and development branch. Mr. Hobson directed technical phases of a program involv-



Prepared by the B. F. Goodrich Company

Sketch Showing 32 Uses of Rubber and Plastics in Modern Airplanes

The use of rubber in automotive construction has been constantly increasing during recent years until in today's new cars there are approximately 265 places in which it is employed to give greater passenger comfort and longer service to the automobile. The accompanying sketch shows 23 of these rubber applications in the automobile. In addition the company believes that its Torsilastic rubber spring will be utilized in cars of the future and thus again extend the use of rubber in automotive construction. Another sketch shows 32 applications of rubber and plastic products in the modern airplane. Here again, increased capacity, speed, and range of the modern airplane have brought a constant upswing in the number of rubber and plastic products used in its construction. The sketch, among other applications, also shows the pneumatic deicers and electrical anticracks developed exclusively by the Goodrich company.

Riding the tails of the Lockheed Constellations since they first went into commercial service in February are specially tailored empennage cross deicers so complicated that they required two years to work out their production methods, according to C. S. Stebbins, deicer technical division manager for Goodrich. Because of the three-dimensional nature of the job—the inflatable ice-breaking tubes run in four directions over raised surfaces and varying contours—it was impossible to provide accurate blue prints or templates, Mr. Stebbins related. For curing, a metal form about a yard square had to be made of stainless steel, as more ductile metals would have suffered harmful reactions in vulcanizing because of the particular rubber compound used. It was necessary to make this form in about a dozen pieces and join them together. With the aid of a plaster cast of the tail assembly and the use of silver solder, an accurate form was finally built and afterward used as a pattern for other forms. These special deicers can now be produced at the rate of four per shift, Mr. Stebbins said.

In farming, no less than in football, the T formation long has been the subject of sharp clashes of opinion. However advocates of the T, or open-cleat, design of tractor-tire tread now can point to results of a nationwide survey in support of their contention. The poll, conducted by Fact Finders Associates, Inc.,

for Goodrich, covered thousands of tractor-owning farmers throughout the 48 states. A little more than two-thirds, 67.7%, of those responding cast their votes for the open-T style, the one where space is left between the shank and the cross-piece of the T made by diagonal raised bars which meet at right angles. The closed-T style, where the bars are at the same angle, but with no space between shank and cross-piece, was favored by 26.6%; while 4.2% of those replying liked the button-type tread, and 1.5% did not indicate any preference. In only four states was there any marked variation from this better than two-to-one favor for the open-T. The self-cleaning advantages of the open-cleat style were cited by more than half of those voting for it as their chief reason for favoring it; while about a third of the farmers cited good traction, and one-sixth felt this style was "best all-around." Those voting for the button type introduced one new factor, saying that it has superior traction in reverse.

B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, through W. S. Richardson, president, has announced entry of the company into the biochemical field. Extensive research and development have progressed to the stage where a number of new chemicals will soon be ready for commercial introduction, he declared. Already serving industry broadly through manufacture of American rubbers, synthetic resins, plastics, rubber chemicals, and chemical intermediates, the company by these new products will be taken further into the agricultural, textile, pharmaceutical, and household chemical fields. Consistent with this announcement, Sam L. Brous, manager of sales development, has appointed Sever L. Hopperstead service engineer to supervise the development and field work for the new biochemical products. Mr. Hopperstead is a graduate of the University of Illinois with a master's degree from the University of Delaware. Since 1938 he had been associate research professor in the department of plant pathology at the Delaware Agricultural Experimental Station, Newark, and also plant pathologist on the State Board of Agriculture at Dover, both in Del.

ing the fabrication of more than 150 million pounds of plastic raw materials and supervised a large staff engaged in research, design, and development work. He received a degree in chemical engineering from Massachusetts Institute of Technology in 1937. From 1937 to 1941 he was a sales engineer for the Bakelite Corp. and entered Monsanto's service last May, following his Army discharge.

Monsanto also announced the following territorial assignments for salesmen in its newly organized textile chemicals department: W. R. Battersby, Maine, New Hampshire, and northeastern Massachusetts; T. E. Lannefeld, Rhode Island, southeastern Massachusetts and eastern Connecticut; E. S. Lamont, New York (except New York City), Vermont, western Massachusetts, and western Connecticut; C. F. Bishop, New York City, upper Pennsylvania, and upper New Jersey; E. H. McCoy, Delaware, Maryland, lower Pennsylvania, and lower New Jersey; F. K. Burre, Virginia, West Virginia, North and South Carolina; R. Gow, III, Middle West; R. N. Foster, Southern States. All eight salesmen have college degrees in chemistry and are technically trained in the application of Monsanto's textile chemicals to fabrics.

Monsanto on December 1 opened a sales office in the Keith Bldg., Cleveland, O., to serve the greater Cleveland area. Robert H. Baugh will supervise the office and represent Monsanto's phosphate division sales in the area. T. C. Tupper will represent the company's organic chemicals division, and R. T. Clark the Merrimac division.

A 25-year debenture issue to provide \$30,000,000 for Monsanto's expansion program, has been placed privately with a group of five insurance companies. The debentures, sold at par, will bear 2.65% interest and will become due November 1, 1971. The proceeds obtained will provide funds for the \$10,000,000 purchase from the WAA of the styrene plant at Texas City, Tex., which Monsanto designed and constructed for the synthetic rubber program. The remainder of the sum will be used for payment of other manufacturing facilities for which commitments have been made. A sinking fund beginning after ten years will be scheduled to retire half of the issue by maturity.

NEW ENGLAND

Davol Rubber Co., Providence, R. I., has received authorization from CPA to make alterations to its factory at a cost of \$7,500.

Farrel-Birmingham Co., Inc., Ansonia, Conn., has reopened its branch office in Chicago, Ill., at 120 S. La Salle St., Room 542, telephone Andover 3300. The office is in charge of Harry Temporal, who has had wide experience as sales representative in the numerous fields for which the company builds equipment. Mr. Temporal has been connected with the company for 26 years. He was formerly Chicago office manager, has been in charge of company branch offices at Cleveland and Akron, and has served in the sales departments at Ansonia and Buffalo.



Barret Textile Corp.

A. C. Simon

Simon Made Technical Director

The H. O. Canfield Co., Bridgeport, Conn., has named A. C. Simon technical director. He had been for the past nine years chief chemist of the Firestone Industrial Products Co., Noblesville, Ind., and is a graduate chemical engineer, a member of the American Chemical Society and of the rubber groups of both Bridgeport and New York.

With Canfield's stepped-up product development program swinging into high gear, it will be part of Mr. Simon's responsibilities to spearhead the many contemplated advancements, relating to technological improvements of existing products as well as new addition to the already extensive Canfield line of mechanical goods in rubber and synthetics.

Stowe-Woodward, Inc., Newton Upper Falls, Mass., at a recent meeting elected William E. Greene chairman of the board, and Fletcher P. Thornton and Oliver P. Arnold vice presidents. All three executives have been with the company for the past 26 years.

Seamless Rubber Co., New Haven, Conn., has announced that Garrett H. Burt is now representing the firm, with offices at 53 W. Jackson Blvd., Chicago, 3, Ill. Mr. Burt has a wide experience in the athletic and sporting goods business.

CANADA

Price Reduction in Canadian Rubbers

The Canadian Rubber Control Board has reduced the price of crude rubber to Canadian manufacturers from 24.91¢ to 22.63¢ a pound. This cut parallels a previous reduction in price of GR-S and Butyl rubbers from 20.35¢ to 18.5¢ a pound. The new crude rubber price is

based on top-grade No. 1 smoked sheet. During the war the price of crude to Canadian users had been fixed at 24.91¢ and even when the United States announced a price cut for the first six months of 1946, the Canadian price remained unchanged. The new revision brings Canadian prices on a virtual parity with those of the United States. In the case of GR-S, the former price of 20.35¢ was merely the price in the United States plus the 10% difference between the dollar in both countries. Dollar parity was made in July, but officials of the government-owned Polymer Corp. only adjusted the two prices to the common 18.5¢ level at the start of November.

Canada, up till now, has pretty well taken its rubber cues from the United States, and there is little indication that the Canadian Government will make any hasty decisions before knowing what the United States intends to do. Or is there any great likelihood that Canada will keep her rubber control much longer in force than the control machinery in the United States. Both governments, however, want some easy formula to protect their synthetic rubber investment once the free British market is established at the start of 1947.

The recent reduction in price of GR-S and Butyl was the seventh announced by Polymer Corp. When the first commercial batch was sold in October, 1943, the price of GR-S stood at 39.96¢ a pound at Sarnia, and for the past nine months it was 20.35¢.

"Foreseeing the day when natural rubber prices will become competitive, Polymer has striven to increase the efficiency of the plant, and thus make possible a gradual lowering of the price of Canadian-made synthetic rubber," said Canadian Reconstruction Minister C. D. Howe, in announcing the reduction. "Thus Polymer has been able to reduce its prices and is continuing to meet competition from natural despite the recent drop in the price of that commodity."

John R. Nicholson, vice president and managing director of Polymer, paid tribute to the technical operators of the Sarnia plant for the part they played in making possible the price reduction in synthetic rubber. Commenting on a recent statement that resumption of free trading in natural rubber would provide the first broad test of strength between crude and synthetic rubber both on the basis of price and of preferred use, Mr. Nicholson said the natural rubber market was in a constant state of flux, and as a means of meeting this competition, the value of science in the synthetic rubber business was becoming more and more apparent. One of the principal means of competition with natural rubber, said Mr. Nicholson, will be the ability of the Dominion's scientists to produce a diversity of products and lines of articles engineered to meet special requirements.

"In fact, ours will be more of a chemical industry as time goes on, rather than a so-called rubber industry," Mr. Nicholson added.

Polymer also reported a consignment of 600 tons of GR-S to France, claimed to be the largest single consignment ever made by the government-owned company to any European nation. The consignment left Sarnia late in October aboard a lake freighter for transshipment at Montreal to a French cargo vessel. It was the second major shipment that was made this year to France; 500 tons were shipped last February.

Patents and Trade Marks

APPLICATION

United States

2,407,634. Shock Absorbing Aerial Towline of Synthetic Plastic. R. C. du Pont, Granogue, assignor to All American Aviation, Inc., Wilmington, both in Del.

2,407,666. Boat Including an Inflatable Body Member Having a Central Opening. C. H. Kearny, United States Army, Fort Clayton, C. Z.

2,407,734. Toy with a Casing Adapted to Receive an Inflatable Bladder. E. C. Bailliere, Warren, O.

2,407,735. Finger Tip Bandage Featuring Strips of Adhesive Material. R. Beckerman, Danbury, Conn.

2,407,807. Curved Composite Material Suitable for Aircraft Fuselages Consisting of a Core of Expanded Rubber United to Plywood or Metal Layers with the Aid of a Thermo-Hardening Resin. C. H. Buchanan, Kingston-on-Thames, assignor to Jicwood, Ltd., Weybridge, both in England.

2,407,922. Wringer. D. K. Ferris, assignor to General Motors Corp., both of Dayton, O.

2,408,006. In a Hydraulic Valve Construction, a Resilient Sealing Ring Carried by the Valve Plunger. T. R. Smith, assignor to Maytag Co., both of Newton, Iowa.

2,408,166. Respiratory Mask. E. R. Hawkins, Compton, Calif.

2,408,194. In a Stand for a Hand Telephone, a Resilient Cushion Fixedly Mounted on the Upper Side of the Base for Receiving the Hand Telephone at Rest on the Stand. J. P. Bourdoux, New York, N. Y.

2,408,214. Sole with Heel Attached thereto, Molded of Rubber-Like Material and Having a Tread of Special Design of the Same Material. H. A. Husted, St. Clair, Mich.

2,408,253. Guard for Electric Cables, Etc., Including C-Shaped Resilient Plastic Material Sleeves, One of Which Has a Rib Extending along Its Length to Prevent Rotative Movement of the Outer Sleeve. B. A. Diebold, Irvington, N. J.

2,408,306. Aerator Including a Minnow Net Supporting Frame, a Handle, and a Collapsible Bulb Mounted on the Handle Member. A. F. Flournoy, Shreveport, La.

2,408,314-315. Shaft Seal. O. Jacobsen, Montgomery County, assignor to Duriron Co., Inc., Dayton, both in O.

2,408,390. Teat Cup for Milking Machines. F. A. Gessler, assignor, by mesne assignments, to Globe Milker, Inc., both of Des Moines, Iowa.

2,408,473. Dust Seal for Adjoining Railroad Cars, Formed of Flexible, Dust and Fluid Impervious Material. C. P. Nelson, Chicago, Ill.

2,408,474. Noise Shield for Transmitter Mouthpieces. E. B. Newman and J. Miller, both of Cambridge, Mass.

2,408,490. Earphone Socket. S. S. Stevens, Cambridge, Mass., assignor to the United States of America, represented by the Executive Secretary of the Office of Scientific Research and Development.

2,408,494. Earphone Socket. P. S. Veneklasen, Saugus, Mass., assignor to the United States of America, represented by the Executive Secretary of the Office of Scientific Research and Development.

2,408,502. Members of Rubber-Like Material for a Waterproof Combined Electric Switch and Pistol Grip. A. A. Writman, Wauwatosa, assignor to Cutler-Hammer, Inc., Milwaukee, both in Wis.

2,408,550. Bed Service Set Including an Excretion Receiving Member with Vertical Walls of Soft Resilient Material. T. D. Crane, Council Bluffs, Iowa.

2,408,662. Rain Protective Garment Including Body and Hood Sections of Waterproof Material. B. A. Levitt, Newark, N. J., assignor to A. L. Siegel Co., Inc., New York, N. Y.

2,408,756. In a Method of Manufacturing a Pile Fabric of Extensive Area from Smaller Pieces, the Use of a Vinyl Resin for Embedding Tufts of the Pile Loops to Render the Fabric Frayproof, and a Tape Carrying an Adhesive Composed Chiefly of a Copolymer of Vinyl Acetate and Vinyl Chloride, to Unite the Pieces of Pile Fabric. J. N. Dow, Longmeadow, Mass., and A. T. Diddilian, Suffield, assignors to Bigelow-Sanford Carpet Co., Inc., Thompsonville, both in Conn.

2,408,792. Arch Support Including a Molded

Expanded Rubber Portion. M. Margolin, Elgin, Ill.

2,408,860. Facial Cleaner with a Cup-Like Member of Rubbery Material. G. L. Lindblad, Chicago, Ill.

2,408,909. Annular Fluid Seal Having a Body of Rubber-Like Material. O. Brummer, Oak Park, Ill.

2,408,960. Flexible Pipe Coupling. W. L. Stivason, Hamilton Square, assignor to Whitehead Bros. Rubber Co., Trenton, both in N. J.

2,409,003. Rubber-Tipped Shuttle for a Loom. R. G. Turner, assignor to Crompton & Knowles Loom Works, both of Worcester, Mass.

2,409,125. Seal for a Fluid Pressure Pump. O. Jacobsen, Montgomery County, assignor to Duriron Co., Inc., Dayton, both in O.

2,409,166. Portable Signal Device Including in Combination a Balloon Bag Formed of Thin Elastic Material, and a Hydrogen Generator Separate from the Bag and Including a Gas-Impervious Casing of Elastic Material Enclosing a Hermetically Sealed Container Having an Acid therein. J. M. Tracy and H. G. Veeder, both of London, Me., N. Y.

2,409,182. Anti-Bounce Shoe for a Pneumatic Tire. G. A. Barker, Rochester, N. Y.

2,409,192. In a Torque-Limiting Clutch Including a Shaft and a Metal Drum thereon, a Non-Metallic Friction Shoe Encircling the Drum. A. A. Collins, Cedar Rapids, Iowa, assignor to Collins Radio Co., a corporation of Iowa.

2,409,220. In a Sump Selector Valve, a Ring Seat of Resilient Yieldable Material. J. F. Melichar and W. Margrave, assignors to Parker Appliance Co., all of Cleveland, O.

2,409,252. In a Self-Sealing Gasoline Container, a Wall Having a Layer of Rubber-Impregnated Rayon, a Layer of Latex, a Layer of Vulcanized Rubber, Another Layer of Latex, and an Inner Layer Consisting of a Plasticized Sheet of Polyvinyl Formal Resin. T. S. Carswell, Longmeadow, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo., N. Y.

2,409,354. In Combination with a Coat, a Carrier Pocket for a Respiratory Apparatus Forming a Part of the Coat; This Apparatus Includes an Air Purifying Canister and a Flexible Air Delivery Hose. A. M. Grunwell, Washington, D. C.

2,409,355. Airplane Wheel with a Tire Having Lateral Foldable Air Pockets Adapted to Rotate the Wheel When It Is Exposed to an Air Stream, and Means for Collapsing the Pockets to Prevent Rotation of the Wheel. A. A. Human, Sacramento, Calif.

2,409,367. Flotation Suit Including a Headpiece Open at the Face and a Torso Portion of Water-Tight Flexible Material. C. W. Leguillon and C. P. Krupp, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,409,433. In Apparatus for Throttling the Flow of Air through the Intake End of a Duct, a Covering Attached to the Outer Wall of the Duct at the Intake End and an Inflatable Tube at the Inner Wall of the Duct. W. H. Hunter, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,409,489. For Opening a Receptacle, a Water-tight Closure Including Flexible Strips Having Elastic Properties. V. H. Hurt, Cranston, R. I., assignor to United States Rubber Co., New York, N. Y.

2,409,490. Anchoring Means of a Copolymer of Vinyl Chloride and Vinyl Acetate for Bristle Tufts in Brushes. C. Jobst, assignor to Toledo Automatic Brush Machine Co., both of Toledo, O.

2,409,500. In a Torsion Bushing Assembly, a Torsion Spring Including Inner and Outer Spaced Apart Elements and an Intervening Body of Resilient Rubber-Like Material. A. S. Krotz, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,409,501. Vehicle Spring Suspension. A. S. Krotz, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,409,502. In a Track Block for a Self-Laying Track-Type Vehicle, a Filling of Resilient Material between the Tread Face and the Wheel-Contacting Face of the Block. C. W. Leguillon and A. S. Krotz, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,409,505. In a Hydraulic Damping Device, a Cylinder Structure Including a Cup-Shaped Body Part and an End Wall for This Body, Both Molded of Plastic Material, and a Piston Including a Head Surrounded by Plastic Material Intimately Molded thereto. G. M. Magrum, Buffalo, N. Y., assignor to Houdaille-Hershey Corp., Detroit, Mich.

2,409,529. Rubber-Sheathed Buoyant Electric Cable. H. L. Beede, Fort Lee, assignor to Okonite-Callender Cable Co., Inc., Paterson, both in N. J.

2,409,530. Electric Cable Including a Paper Insulated Conductor, a Bare Conductor, an Enclosing Polyethylene Tetrasulfide Sheath, and an Armor of Paper Impregnated with Terpin Hydrate. C. E. Bennett, Ridgewood, assignor to Okonite Co., Passaic, both in N. J.

2,409,531. Electrode for Buoyant Electric Cables. C. E. Bennett, Ridgewood, assignor to Okonite-Callender Cable Co., Inc., Paterson, both in N. J.

2,409,564. In a Composite Transfer Sheet Including a Base Sheet of Paper, a Sheet of Ethyl Cellulose, and a Photosensitive Layer, a Top Layer of Vinyl Resin. W. and F. Heinecke, both of Verona, N. J., assignors to Di-Noc Mfg. Co., Cleveland, O.

Dominion of Canada

436,831. In a Transmission for Phonograph Turntables, Rubber Grommets for Mounting the Motor Supporting Plate upon the Base Plate. Alliance Mfg. Co., assignee of E. V. Schneider, both of Alliance, O., U.S.A.

436,863. Apparatus for Distributing Liquid to Propellers. B. F. Goodrich Co., New York, N. Y., assignee of W. H. Hunter, Lakewood, O., both in the U.S.A.

436,865. For Preventing the Accumulation of Ice on the Leading Edge of an Airfoil, a Device Including a Covering of Rubber-Like Material Having Small-Diameter Inflatable Tubular Passages therein, and Means for Inflating These Passages. B. F. Goodrich Co., New York, N. Y., assignee of E. E. Heston, Akron, O., both in the U.S.A.

436,866. Apparatus for Preventing the Accumulation of Ice on the Leading Edge of an Airfoil. B. F. Goodrich Co., New York, N. Y., assignee of J. O. Antonson, Akron, O., both in the U.S.A.

436,870. Flexible Fuel Container. Imperial Chemical Industries, Ltd., London, assignee of L. Shakesby, Bradmore, Wolverhampton, both in England.

437,065. Cellular Material Having a Basis of an Organic Derivative of Cellulose. C. G. Bonard, London, administrator of the estate of H. Dreyfus, deceased, in his lifetime of London, assignee of W. I. Taylor, Spondon, both in England.

437,122. Inflatable Gasket. Dunlop Rubber Co., Ltd., London, assignee of W. E. W. Petter and S. T. A. Richards, both of Yeovil, and W. M. Widgey, Marston Magna, both in Somerset, all in England.

437,123. Composite Strip Including a Base Material Carrying a Set Extruded Synthetic Resinous Cellulose Derivative Plastic Permanently Welded thereto. Extruded Plastics Inc., Norwalk, assignee of C. E. Slaughter, New Canaan, both in Conn., U.S.A.

437,127. In a Seal for a Glass Container, a Gasket of Compressible, Resilient Material. Hartford-Empire Co., Hartford, assignee of W. K. Berthold, Rockville, both in Conn., U.S.A.

437,153. Resin-Treated Paper Products. Resinous Products & Chemical Co., Philadelphia, assignee of R. W. Auten, Jenkintown, and C. L. Smith, Wayne, all in Pa., U.S.A.

437,163-164. For Use in the Manufacture of Welt Insoles, a Sewing Rib of Koroseal, Vinylite, or the Like. Wright-Batchelder Corp., Boston, Mass., assignee of W. C. Wright, Brookfield, N. H., both in the U.S.A.

437,197. Brassiere with Elastic Top. M. Rondeau, Peapack, P. Q.

437,247. In the Manufacture of Space Filling Material of a Structurally Intersticed Mass of Conglomerate Fibrous Materials, the Use of a Rubber-Like Dispersion as Bonding Substance. Sponge Rubber Products Co., Shelton, assignee of A. Talalay, New Haven, both in Conn., U.S.A.

437,258. Members of Resilient Material in Molding Apparatus for Laminated Structures. Vidal Corp., Camden, assignee of W. A. Taylor, Wildwood, both in N. J., and E. L. Vidal, Washington, D. C., both in the U.S.A.

437,261. Display Card Bearing Packages, Each Containing a Material Which Emits Carbon Dioxide, and Each Enclosed in a Transparent Film Permeable to This Gas; the Display Card Is Enclosed in a Moistureproof, Gas-Impervious Film. Wingfoot Corp., assignee of L. K. Hanson, both of Akron, O., U.S.A.

United Kingdom

579,892. Insulated Wires and Cables. W. T. Henley's Telegraph Works Co., Ltd., and J. Harvey.

579,905. High Frequency Cables. Standard Telephones & Cables, Ltd.

579,913. Fountain Pens. L. J. Biro.

PROCESS

United States

- 2,407,768. Closing the Slitted End of a Receptacle of Vulcanizable Material. B. Predmore, assignor to Seamless Rubber Co., both of New Haven, Conn.
- 2,408,778. Making a Comb from Sheet Stock. W. Huppert, New York, N. Y., assignor to Delamere Co., Inc., a corporation of Del.
- 2,408,789. Inflatable Boat. A. G. Luisada, New York, N. Y.
- 2,409,486. Balloons. J. A. Hagen, Glen Rock, E. L. Gregor, Ramsey, and L. Prendergast, assignors to Molded Latex Products, Inc., both of Passaic, all in N. J.
- 2,409,539. Marking the Surface of the Insulation of Insulated Wire and Cable and Vulcanizing the Same in a Continuous Operation. G. W. Brown, Wyckoff, assignor to Okonite Co., Passaic, both in N. J.

Dominion of Canada

- 437,222. Improved Method of Injection Molding Thermal-Setting Plastic Material. French Oil Mill Machinery Co., assignee of T. F. Stacy, both of Piqua, O., and M. D. Farmer, East Aurora, N. Y., both in the U.S.A.
- 437,268. Thick Sheets of an Acetone-Soluble Cellulose Acetate. C. G. Bernard, administrator of the estate of H. Dreyfus, deceased, in his lifetime of London, England.

United Kingdom

- 579,944. Waterproofing Materials Containing Fibers of an Organic Derivative of Cellulose. British Celanese, Ltd.
- 579,983. Bonding Rubber to Brass-Plated Surfaces. John Bull Rubber Co., Ltd., Metalastik, Ltd., and C. M. Blow.
- 580,134. Treatment of Fabric. International Latex Processes, Ltd.
- 580,742. Production of Sheets and Other Shaped Articles from Disintegrated Leather, and Other Fibrous, Finely Divided Materials, and Natural or Synthetic Rubber. W. F. Smith, H. Taylor, and Imperial Chemical Industries, Ltd.
- 580,776. Composite Products of Rubber and Rayon. Dunlop Rubber Co., Ltd., and J. W. Illingworth.
- 580,838. Pneumatic Tires. United States Rubber Co.
- 580,855. Removal of Stresses from Thermoplastic Resin Articles. C. H. Crooks, W. A. Greenwood, D. Starkie, H. Silber, and Imperial Chemical Industries, Ltd.
- 580,883. Waterproof Fabrics. Sylvania Industrial Corp.

CHEMICAL

United States

- 2,407,668. Fire Resistant Coating Composition Including Material from the Group of n-Butyl Methacrylate Polymers and the Ethyl, Methyl, and Propyl Ester Polymers of Acrylic and Methacrylic Acids; Plasticizer; Material from the Group of Polyvinyl Chloride Polymer and Vinyl Chloride-Vinyl Acetate Copolymer; a Solvent; Zinc Carbonate; and a Fungicidal Material. M. Leatherman, Hyattsville, Md.
- 2,407,689. Composition Including an Organic Substance Plasticized with a Carboxylic Acid Ester of a Compound from the Group of Indene Halohydrines and Alkyl Indene Halohydrines. F. J. Soday, Baton Rouge, La., assignor to United Gas Improvement Co., a corporation of Pa.
- 2,407,766. Alkyd Resin Including the Reaction Products Formed by Heating a Polycarboxylic Acid, a Polyhydric Alcohol, and a Pentane-Insoluble Acid Material. J. H. Perrine, Prospect Park, and H. L. Johnson, Norwood, assignors to Sun Oil Co., Philadelphia, all in Pa.
- 2,407,825. Continuous Process of Separating an Aliphatic Conjugated Diolefin from Admixture with Close-Boiling Corresponding Olefin and Paraffin. F. E. Frey, Bartlesville, Okla., and R. D. Snow, Edgewood, Md., assignors to Phillips Petroleum Co., a corporation of Del.
- 2,407,848. Production of Acrylonitrile by Passing Succinonitrile over a Catalyst from the Group of Activated Carbon, Alumina, Bauxite, and Alumina Adsorbed on Silica. G. C. Ray, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.
- 2,407,920. Pentaerythritol. R. F. B. Cox,

assignor to Hercules Powder Co., both of Wilmington, Del.

- 2,407,937. An Ester of a Carboxylic Organic Acid and Trimethyl Butyl Hexahydrobenzyl Alcohol. A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.
- 2,407,943. Reducing the Tendency of a Polyvinyl Acetal Pressure Molding Composition to Stick to the Mold by Incorporating Glycolic Acid. G. W. Whitehead, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.
- 2,407,946. In a Method of Copolymerizing Vinyl Compounds, the Step of Catalyzing the Reaction with the Aid of a Peroxygen Compound, a Ferric Salt of an Inorganic Acid and an Acid to Bring the pH Value of the Polymerization Mixture to between 1.5 and 3. E. C. Britton and W. J. Le Fevre, assignors to Dow Chemical Co., all of Midland, Mich.
- 2,407,953. Tacky Rubber-Like Composition Including a Major Portion of a Non-Tacky Rubber-Like Copolymer and a Minor Portion of a Tacky, Cyclohexanone-Soluble Copolymer. R. R. Dreishach, E. C. Britton, and W. J. Le Fevre, assignors to Dow Chemical Co., all of Midland, Mich.
- 2,407,988. Impregnating Porous Cellulosic Material with a Mixture of Terpene Dihydrochloride and Cellulose Acetate. C. Luckhaupt, Jamaica, L. I., N. Y., assignor to Luckite Processes, Inc., Delawanna, N. J.
- 2,407,989. Treating Cellulosic Material to Render It Water- and Oil-Resistant by Impregnation in a Bath of Terebene and Cellulose Acetate. C. Luckhaupt, Jamaica, L. I., N. Y., assignor to Luckite Processes, Inc., Delawanna, N. J.
- 2,407,997. Separating Isoprene from a Refinery Cracked Stock. J. A. Patterson, Westfield, N. J., assignor to Standard Oil Development Co., a corporation of Del.
- 2,408,007. Improved Polymerization Products Obtained by Polymerizing at a Temperature between -50 and -150° C. a Mixture of Isobutylene and a Conjugated Diolefin in the Presence of Aluminum Chloride Dissolved in an Inert Solvent, and Treating the Resultant Solid Polymer with a Volatile Hydrocarbon Solvent. R. M. Thomas, Union, and D. C. Field, Linden, both in N. J., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.
- 2,408,127. High Molecular Weight Polyene Aldehydes. G. W. Seymour and V. S. Salvin, both of Cumberland, Md., assignors to Celanese Corp. of America, a corporation of Del.
- 2,408,128. Process of Preparing Synthetic Rubber-Like Materials, Which Includes the Coagulation of a Latex Obtained by Polymerization of a Diolefin in Aqueous Emulsion. W. Squires, Jr., and P. T. Parker, both of Baton Rouge, La., assignors to Standard Oil Development Co., a corporation of Del.
- 2,408,139. Continuous Production of a Diolefin from the Corresponding Monoolefin by Catalytic Dehydrogenation. G. L. Gutzeit, Terre Haute, Ind., assignor to Shell Development Co., a corporation of Del.
- 2,408,174. Coating Composition having Decreased Gelling Tendencies, Including a Resin Obtained by Copolymerization of Vinyl Acetate; This Resin Is Dissolved in a Solvent Including an Alkyl Ester of Levulinic Acid and a Liquid Coal-Tar Hydrocarbon. G. H. Morey, assignor to Commercial Solvents Corp., both of Terre Haute, Ind.
- 2,408,177. Manufacturing Methyl Acrylate by Thermally Decomposing Methyl Alpha-Acetoxypropionate at a Temperature of 400 to 600° C. and a Pressure of 3 to 60 Atmospheres. W. P. Ratcliff, Willow Grove, and C. H. Fisher, Abington, both in Pa., assignors to C. R. Wickard, as Secretary of Agriculture of the United States of America, and his successors in office.
- 2,408,296. Reclaiming Process Including Subjecting Pieces of Scrap Rubber to Intense Mechanical Action in a Heated Internal Mixer in the Presence of Oxygen. F. H. Cotton, East Barnet, assignee of P. A. Gibbons, London, both in England.
- 2,408,297. Adhesive, Waterproof Composition Including Asphalt, Cetyl Acetamide Wax, and a Polyisobutylene. R. H. Cumberley, Ridge-wood, and F. W. Yeager, Englewood, both in N. J., assignors to Patent & Licensing Corp., New York, N. Y.
- 2,408,377. Normally Flexible Plasticized Polyvinyl Alcohol Composition Containing as a Thermostabilizing Agent a Substance from the Group of Chlorides of Aluminum and Tin. C. Danglemajer, Nutley, assignor to Resistoflex Corp., Belleville, both in N. J.
- 2,408,391. Ketone Condensed With a Primary Aminoindan in the Presence of an Acidic Condensation Catalyst. C. F. Gibbs, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.
- 2,408,402. Copolymer of Trichloroethylene and Methyl Methacrylate. H. W. Arnold, Marshallton, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

- 2,408,416. For High-Tension Electric Cables, a Semi-Conducting Coating Composition Including a Resinous Vehicle Containing a Non-Drying Oil Modified Alkyd Resin, a Polyvinyl Acetal Resin, a Urea-Formaldehyde Resin, and a Carbon Black. D. E. Edgar, Westport, and D. J. Sullivan, Fairfield, both in Conn., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
- 2,408,426. Polymerizing a Dispersion of Monomeric Methyl Methacrylate in Water in the Presence of 0.01 to 3% by Weight of the Monomer of Trichloroethylene at a Temperature of 100-150° C. under Autogenous Pressure. F. L. Johnston, Claymont, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.
- 2,408,519. 4-Keto-Tetrahydrothiophenes. A. W. d'A. Avison, F. Bergel, and J. W. Haworth, assignors to Roche Products, Ltd., all of Welwyn Garden City, England.
- 2,408,608. Chlorination of a Copolymer of Vinyl Chloride and Vinylidene Chloride. O. W. Cass, Niagara Falls, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
- 2,408,609. Chlorination of a Copolymer of Vinyl Chloride and Trichloroethylene. O. W. Cass, Niagara Falls, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
- 2,408,682. In the Production of a Composite Product Consisting of a Layer of Polyvinyl Alcohol Composition Adhered to a Layer of Fibrous Material, Treating the Latter with a Linear Ethylene Amine. C. A. Porter, Nutley, assignor to Resistoflex Corp., Belleville, both in N. J.
- 2,408,690. Polymerization of a Vinyl Aromatic Compound Which Includes Dissolving in the Vinyl Aromatic Compound prior to Complete Polymerization a Minor Amount of Sodium Oleyl Sulfate and Oleyl Alcohol. R. B. Seymour, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.
- 2,408,696. Treating Finely Divided Hydrogen-Containing Carbon Black with Gaseous Halogen so as to Leave More Than 1% Hydrogen Halide Adsorbed on the Black. H. M. Smallwood, Nutley, N. J., assignor to United States Rubber Co., New York, N. Y.
- 2,408,769. New Industrial Product Including a Solution of Chloride of Polyvinyl in a Member of the Group of Cyclopentanone and Methyl-Cyclopentanone. M. L. A. Fluchsaie, Lyon, France; vested in the Alien Property Custodian.
- 2,408,853. Reducing the Resin Content of Guayule Rubber by Treating a Mixture of Guayule Rubber and Water with Pseudomonas boreopolis Organisms. S. R. Hoover, Philadelphia, Pa., P. J. Allen, Robles del Rio, Calif., and J. Naghschi, Philadelphia, Pa., assignors to the United States of America, as represented by the Secretary of Agriculture.
- 2,408,889. Production of an Acrylyl Compound by Adding Vinylidene Chloride to a Mixture of Sulfuric Acid and a Member of the Group of Formaldehyde and Polymers thereof, in Water. N. Short, Runcorn, England, assignor to Imperial Chemical Industries, Ltd., a corporation of Great Britain.
- 2,408,905. Preparing Esters of Polyhydroxy Compounds and Unsaturated Higher Fatty Acids. H. C. Black and C. A. Overley, assignors to Industrial Patents Corp., all of Chicago, Ill.
- 2,408,922. Separating Isoprene from Mixtures thereof with One or More Compounds from the Class of Monoolefins and Paraffins Having Vapor Pressures Close to That of Isoprene, by Azeotropic Distillation. T. W. Evans, Oakland, R. C. Morris, Berkeley, and E. C. Shokal, Oakland, assignors to Shell Development Co., San Francisco, all in Calif.
- 2,408,970. Purification of Diolefins Contaminated by the Presence of Relatively Small Proportions of Approximately the Same Boiling Points. T. F. Doimani, Long Beach, and D. A. Skinner, Compton, assignors to Union Oil Co. of California, Los Angeles, all in Calif.
- 2,409,086. As a New Chemical Compound, Gamma-Formyl Pimelonitrile. J. F. Walker, Lewiston, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
- 2,409,124. Preparing Acrylonitrile by Reacting Acetylene and Hydrocyanic Acid in an Aqueous Solution of Cuprous Halide as a Catalyst at a Temperature within the Range of 60 to 110° C. R. V. Huser, Glenbrook, Conn., assignor to American Cyanamid Co., New York, N. Y.
- 2,409,126. Polymerized N-(Alpha-Methacrylyl)-Di-Alpha-Aminophenyl Acetic Acid Ethyl Ester. W. O. K-nvon and D. D. Remond, assignors to Eastman Kodak Co., all of Rochester, N. Y.
- 2,409,173. Heatable Resin of High Unsaturation and Subjecting It to the Action of an Alcohol and of Sulfur to Obtain a Resin Ester of Low Unsaturation. F. J. Webb, Passaic, assignor to

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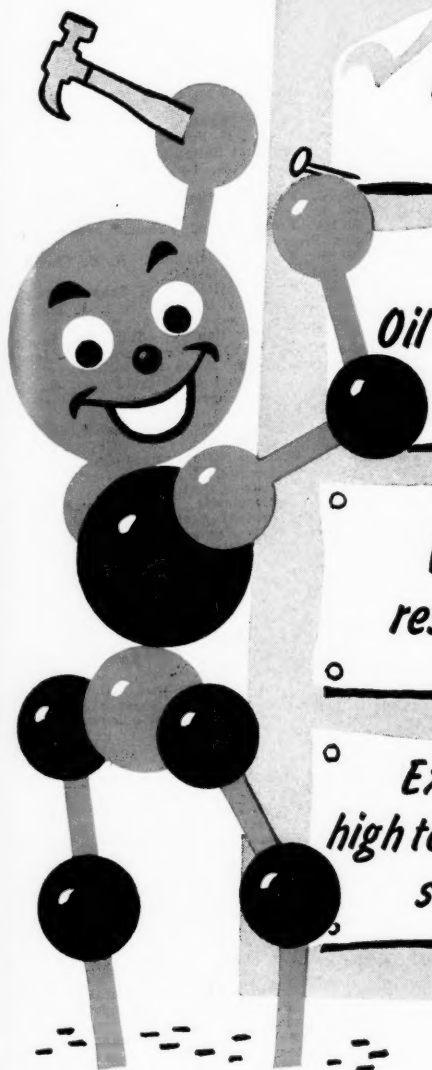
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Ridbo Laboratories, Inc., Paterson, both in N. J.

2,409,230. Process for Isolating a Butadiene Fraction from a Gas Mixture Containing Butadiene and Hydrocarbons of Greater Volatility Than Butadiene. E. J. Cannon, Dunbar, and H. A. Stuewe, South Charleston, both in W. Va., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,409,274. Polyfluoroethyl Ether. W. E. Hanford, Easton, Pa., and G. W. Rigby, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,409,276. Heating Together One Part to Ten Parts by Weight of a Blown Terpene Product with One Part of a Polyvinyl Ester to Form a Gel When Cooled. M. T. Harvey, East Orange, N. J., assignor to Harvel Research Corp., a corporation of N. J.

2,409,277. Polymerized 2-Chlor Butadiene Plasticized with a Plasticizer from the Group of Hydrocarbon Ethers of Cashew Nut Shell Liquid and Distillates of Cashew Nut Shell Liquid and the Heat Thickened Products of the Ethers. M. T. Harvey, South Orange, N. J., assignor to Harvel Corp., a corporation of N. J.

2,409,332. As a New Composition of Matter, a Terpenic Resinous Acid Ester of Pentacrythritol-Glycerine Ether-Alcohol. H. C. Woodruff, Philadelphia, Pa.

2,409,336. Chemical-Resistant and Non-Tacky Film-Forming Paint Composition Including Polybutenes Having Molecular Weights between 60,000 and 300,000 as Determined by the Staudinger Viscosity Method, a Volatile Hydrocarbon Liquid, and an Alkanol Dissolved in the Volatile Hydrocarbon Liquid with the Polybutenes, and a Suspended Solid Filler with a Small amount of a Wetting Agent. D. W. Young, Roselle, N. J., assignor, by mesne assignments, to Jasco, Inc., a corporation of La.

2,409,344. Softening a Rubber-Like Chloroprene Polymer by Mixing with It a Salt of a Dialkylidithiophosphoric Acid and a Salt-Forming Organic Base. A. R. Davis, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,409,402. Separating Metal from Soft Rubber Vulcanized thereto, by Weakening the Rubber-to-Metal Bond by Exposure to a Gaseous Mixture of Steam and the Vapor of a Rubber Softening Oil at a Temperature of 300-425° F. for at Least 16 Hours. H. H. Thompson and D. V. Moore, assignors to Wingfoot Corp., all of Akron, O.

2,409,437. Rubber Compounding Material Including a Friable Resin Made by Heating Together a Mixture of a Petroleum Pitch Polymer with Softening Point above 200° F., which Contains Vanadium Pentoxide in Excess of 0.20%, as a Natural Ingredient; and a Bituminous Hydrocarbon Mixture Compatible with Rubber and Melting below 70° F. C. G. La Crosse, Baltimore, Md.

2,409,441. Glycols. F. J. Metzger, New York, N. Y., assignor, by mesne assignments, to U. S. Industrial Chemicals, Inc., New York, N. Y.

2,409,521. In the Extrusion of a Vinylidene Chloride Polymer, the Step of Introducing into and Mixing with the Polymer Feed to the Extrusion Zone at Atmospheric Pressure, Small Amounts of the Vapor of a Chlorinated Lower Aliphatic Hydrocarbon so that the Partial Pressure of the Chlorinated Hydrocarbon in the Extruded Polymer is Below Atmospheric Pressure at Extrusion Temperature. R. M. Wiley, assignor to Dow Chemical Co., both of Midland, Mich.

2,409,548. Composition Including a Polyvinyl Acetal Resin and a Partial Ester of a Polyhydric Alcohol and a Saturated Monocarboxylic Aliphatic Acid. M. O. Debacher, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

Dominion of Canada

436,886. Artificial Glass Including a Rigid Transparent Plastic Base Surfacted with a Wear-Resistant Polymer of an Organic Oxygen Compound Containing in Its Monomeric Form at Least Two Polymerizable Unsaturated Groups. Pittsburgh Plate Glass Co., Pittsburgh, Pa., assignee of M. A. Pollack, I. E. Muskat, and F. Strain, all of Akron, and W. A. Franta, Barberton, both in O., both in the U.S.A.

436,923-924. Forming Retractable Articles Having Sufficient Plasticity and Extensibility in the Moist and Gel State to Permit Stretching thereof. Société de la Visene Française, assignee of R. Picard and R. Faye, all of Paris, France.

436,993. A Diamine-Dibasic Carboxylic Acid Salt. Canadian Industries Ltd., Montreal, P. Q., assignee of W. E. Hanford, Wilmington, Del., U.S.A.

436,994. N,N'-Polymethylene-Bis-O-Hydroxy-Benzamide Modified Polyamide. Canadian In-

dustries, Ltd., Montreal, P. Q., assignee of G. T. Vaala, Wilmington, Del., U.S.A.

437,002. Depolymerizing a Solid Synthetic Linear Polyamide to a Fluid Mass by Heating in the Presence of Water, Removing the Water, and Polymerizing the Residue. Canadian Industries, Ltd., Montreal, P. Q., assignee of W. R. Peterson, Wilmington, Del., U.S.A.

437,003. Yarn Sizing Composition Including a Water-Sensitive Hydroxylated Polyvinyl Resin, Boric Acid, and Polyethylene Oxide. Canadian Industries, Ltd., Montreal, P. Q., assignee of D. E. Strain, Wilmington, Del., U.S.A.

437,004. Yarn Sizing Composition Including an Aqueous Solution Containing a Partially Saponified Polyvinyl Acetate and Boric Acid. Canadian Industries, Ltd., Montreal, P. Q., assignee of R. H. Wiley, Wilmington, Del.

437,005. Interpolyamide Obtained by Heating Polyamide-Forming Reactants Including Hexamethylenediamine and Sebacic Acid, and Tetramethylenediamine and Adipic Acid. Canadian Industries, Ltd., Montreal, P. Q., assignee of R. H. Wiley, Wilmington, Del., U.S.A.

437,008. Water-Soluble Condensation Products Obtained by Reacting an N,N'-Bis (Alkoxy-methyl) Urea with a Glycol and a Monosulfonamide of a Straight-Chain Hydrocarbon Having about 13 to 20 Carbon Atoms. Canadian Industries, Ltd., Montreal, P. Q., assignee of W. J. Burke, Marshallton, and H. J. Wertz, Wilmington, both in Del., U.S.A.

437,036. Flexible Sheets for Use as Packing Made from an Intimate Mixture of Solvent Reduced Polychloroprene Binder and Asbestos Fibers. Johns-Manville Corp., New York, N. Y., assignee of J. Driscoll, Plainfield, N. J., both in the U.S.A.

437,116. Coating Composition for Paper Containing a Copolymer of Vinyl Chloride 86%, Vinyl Acetate 13%, Maleic Acid 1% by Weight, Respectively, a Copolymer of Vinyl Chloride 87%, Vinyl Acetate 13%, by Weight, Respectively, Polymerized Liquid Terpene Resin, Paraffin Wax, Methyl Ethyl Ketone, Methyl Isobutyl Ketone, and Hydrogenated Petroleum Naphtha. Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of G. M. Powell, III, South Charleston, and W. H. McKnight, Charleston, both in W. Va., U.S.A.

437,117. Production of Esters from Olefins. Distillers Co., Ltd., Edinburgh, Scotland, assignee of H. M. Stanley, Tadworth, and J. E. Youell, Wallington, both in Surrey, England.

437,209. Polymerizable Composition Including at Least One Polyester Obtained by Reaction of a Polycarboxylic Acid with a 3-Hydroxy Alkene-1, and at Least One Unsaturated Alkyd Resin. Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Aleio, Pittsfield, Mass., U.S.A.

437,225. Composition Obtained by Condensation of Butadiene with Diphenylamine in the Presence of an Acidic Condensation Catalyst. B. F. Goodrich Co., New York, N. Y., assignee of A. W. Sloan, Stow, O., both in the U.S.A.

437,227. In a Method of Forming Laminated Structures, the Use of Acetylene Black Mixed with Synthetic Resin Adhesive to Give the Mixture Direct Current Resistance without Destroying Its Adhesive Properties. Honorary Advisory Council for Scientific & Industrial Research, assignee of W. Gallay and G. G. Graham, all of Ottawa, Ont.

437,250. As Filler for Paint, Rubber, Paper, Etc., a Calcium Carbonate Product in Powder Form Including Mechanically Ground Limestone Particles. Thompson-Weinman & Co., Cartersville, Ga., assignee of A. R. Lukens, Cambridge, Mass., both in the U.S.A.

United Kingdom

579,881-883. Polymerization of Ethylene. E. I. du Pont de Nemours & Co., Inc.

579,884. High-Molecular Compounds. E. I. du Pont de Nemours & Co., Inc.

579,887. Polymers of Acrylonitrile and Shaped Articles therefrom. E. I. du Pont de Nemours & Co., Inc.

579,889. Dispersion of Ethylene Polymers. Imperial Chemical Industries, Ltd.

579,894. Solid and Semi-Solid Polymers of Olefinic Hydrocarbons. E. I. du Pont de Nemours & Co., Inc.

579,899. Polymeric Materials. Wingfoot Corp.

579,901. Protective Coating Compositions. Sir F. R. G. Turner, I. G. Slater, and L. Kenworthy.

579,938. Polymerization of Ethylene. J. S. A. Forsyth and Imperial Chemical Industries, Ltd.

580,020. Polymerization of Vinyl Acetate. Imperial Chemical Industries, Ltd.

580,035. Vinyl Cyanide. E. I. du Pont de Nemours & Co., Inc.

580,051. Reclaiming of Vulcanized Synthetic Rubber-Like Materials. Dunlop Rubber Co., Ltd., D. F. Twiss, and W. A. McCowan.

580,078. Thermosetting Plastics. Wingfoot Corp.

580,084. Anti-Coagulant BIs (4-Hydroxycoumarins). Wisconsin Alumni Research Foundation.

580,088. Production of Styrene and Its Homologs by Dehydrogenation. Distillers Co., Ltd., H. M. Stanley, F. E. Salt, and T. Weir.

580,120. Modified Synthetic Resins. W. Walker & Sons, Ltd., J. R. Alexander, D. Burton, and F. Hausmann.

580,140. Fluorinated Organic Compounds. W. B. Whalley and Imperial Chemical Industries, Ltd.

580,154. Rubber Substitute. H. A. Brassett & Co., Ltd., and F. Frank.

580,155. Material Suitable for Flexible Films. Dunlop Rubber Co., Ltd., D. F. Twiss, and F. A. Jones.

580,182. Polymerization of Olefins. E. I. du Pont de Nemours & Co., Inc.

580,134. Treatment of Fabric. International Latex Processes, Ltd.

580,190. Neoprene Solutions. B. B. Chemical Co., Ltd., and A. March.

580,206. Water-Resistance of Shaped Articles Including Polyvinyl Alcohol. E. I. du Pont de Nemours & Co., Inc.

580,247. Plasticization of Rubber. Dunlop Rubber Co., Ltd., D. F. Twiss, and F. A. Jones.

580,250. Synthetic Resin Compositions of Improved Physical and Chemical Properties. W. E. F. Gates and Imperial Chemical Industries, Ltd.

580,258. Coating Compositions. E. I. du Pont de Nemours & Co., Inc.

580,260. Organic Nitro Compounds. A. E. W. Smith, G. W. Scaife, H. Baldoek, and Imperial Chemical Industries, Ltd.

580,275. Thermoplastic Plastic Compositions Including Polyvinyl Acetal and Ketal Resins. E. I. du Pont de Nemours & Co., Inc.

580,310. Olefin Polymerization Process. Shell Development Co.

580,333. Adhesive Compositions. B. F. Goodrich Co.

580,366. Copper Mercaptides. E. I. du Pont de Nemours & Co., Inc., and A. L. Fox.

580,383. Aldehydes. British Celanese, Ltd.

580,392. Piperidino-Ethanol Ester of Di-n-Butylacetic Acid. J. R. Geigy, A.G.

580,405. Synthetic Resinous Condensation Products. British Thomson-Houston Co., Ltd.

580,408. Lacquers and Plastic Masses. J. G. M. Bremner, D. G. Jones, S. F. Pearce, S. F. Smith, and Imperial Chemical Industries, Ltd.

580,416. Solid and Semi-Solid Polymers from Aliphatic Monolefins. E. I. du Pont de Nemours & Co., Inc.

580,417. Polymeric Materials. Wingfoot Corp.

580,469. Acetylene Tetraesters of Aliphatic Monocarboxylic Acids and Polymers and Copolymers thereof. Imperial Chemical Industries, Ltd.

580,514. Sulfur-Containing Polymers. Imperial Chemical Industries, Ltd.

580,524. Treatment of Materials and the Production of Flexible Gasoline-Resistant Articles from the Treated Materials. B. J. Haggood, D. A. Harper, R. W. J. Reynolds, and Imperial Chemical Industries, Ltd.

580,526. Curing Polymeric Materials. D. A. Harper, H. P. W. Huggill, and Imperial Chemical Industries, Ltd.

580,537. Improving Water-Resistance of Resins and Resinous Articles. Norton Grinding Wheel Co., Ltd.

580,612. Catalytic Masses for Hydrocarbon Synthesis. K. M. Chakravarty.

580,617. Reclaiming Waste Rubber. B. F. Dishon and F. G. Bergmann.

580,643. Separation and Concentration of Diolefins. Standard Oil Co. of California.

580,644. Separation of Butadiene from Alkylacetylenes. Standard Oil Co. of California.

580,665. Methacrylic Esters and Polymers and Interpolymers thereof. J. W. C. Crawford, R. H. Stanley, and Imperial Chemical Industries, Ltd.

580,729. Plastic Compositions. W. T. Henley's Telegraph Works Co., Ltd., H. A. Tunstall, and W. F. O. Pollett.

580,731. Polyvinyl Chloride. P. W. Denny, and Imperial Chemical Industries, Ltd.

580,740. Preservation of Rubber or Rubber-Like Materials. B. F. Goodrich Co.

580,743. Expanded Plastic Materials. Expanded Rubber Co., Ltd., and A. Cooper.

580,748. Vinyl Ethers. W. J. R. Evans and Imperial Chemical Industries, Ltd.

580,899. Drying Alcohol Wet Polyvinyl Alcohol. E. I. du Pont de Nemours & Co., Inc.

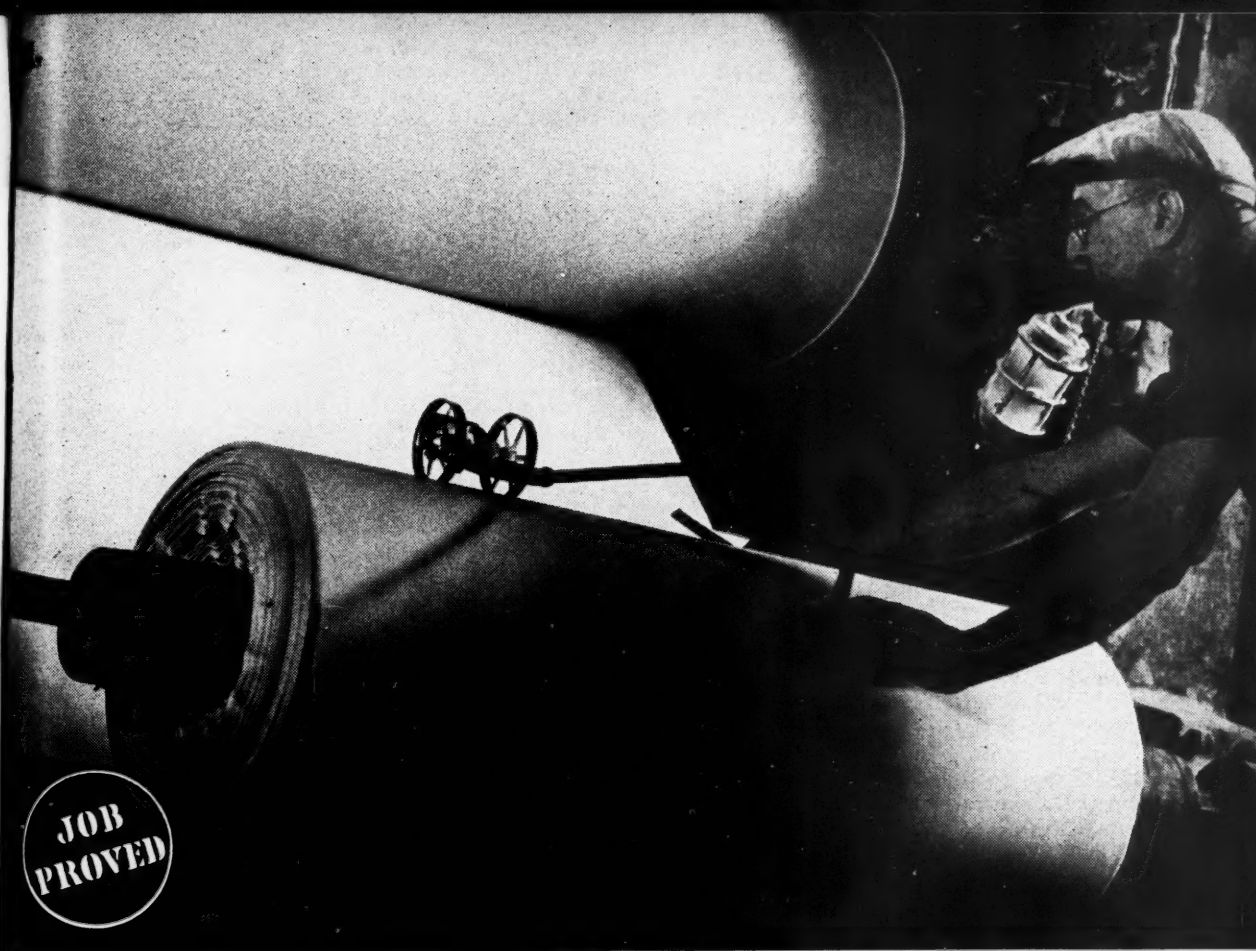
580,910. Catalyst Compositions and Their Application in the Syntheses of Vinyl Fluorides. E. I. du Pont de Nemours & Co., Inc.

580,911. Polystyrene. L. Berger & Sons, Ltd., L. E. Wakeford, D. H. Hewitt, and F. Armitage.

580,912. Manufacture of Interpolymers of Styrene with Polyhydric Alcoholic Mixed Esters, and Coating Compositions Obtained therefrom. L. Berger & Sons, Ltd., L. E. Wakeford, D. H. Hewitt, and F. Armitage.

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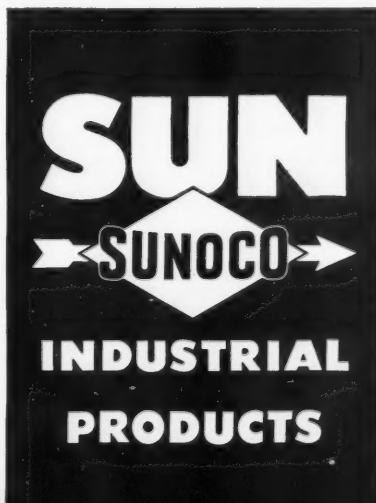
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580,913. **Manufacture of Interpolymers of Styrene with Frosting Drying Oils and of Coating Compositions Obtained therefrom.** L. Berger & Sons, Ltd., L. E. Wakeford, D. H. Hewitt, and R. R. Davidson.
 581,006. **Solvent Extraction of Hydrocarbons.** Standard Oil Development Co.
 581,035. **Vinyl Cyanide.** E. I. du Pont de Nemours & Co., Inc., C. R. Harris, and W. C. Sharples.
 581,076. **Fatty Acid Aryl Hydrazide Sulfonic Acids.** J. R. Geigy, A.G.

MACHINERY

United States

2,407,083. **Cable Splice Vulcanizing Mold.** W. G. Prentice, Indianapolis, Ind.
 2,407,906. **Apparatus for Applying Tread Material to Tire Casings.** M. V. Arnold, Clay, N. Y., and J. W. Napier, Macon, Ga.
 2,408,398. **Plastic Extruder to Form Composite Elongate Articles.** T. L. Johnson, St. Louis, Mo.
 2,408,627. **Die for Extrusion Apparatus for Thermoplastic Material.** L. B. Green, Lakewood, O.
 2,408,639-630. **Molding Apparatus for Thermoplastic Material.** L. B. Green, Lakewood, O.
 2,408,911. **Plastic Molding Machine.** A. A. Barry, Toronto, Ont., Canada, assignor to C. Fuller.
 2,409,571. **Splicer for Unvulcanized Rubber-Like Tread-Material.** C. W. Leguillon, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

Dominion of Canada

436,946. **Machine for Continuously Impregnating and Coating Sheets with Plastic Material.** H. A. Evans, Lynn, Mass., U.S.A.
 437,066. **Rubber Latex Heater.** H. H. G. Grell, New York, N. Y., assignee of R. A. Dufour, Paris, and H. A. Leduc, Mantes-Cassicourt, Seine-et-Oise, both in France.
 437,121. **Brake or Clutch Mechanism.** Dunlop Rubber Co., Ltd., London, assignee of H. J. Butler, Foleshill, both in England.

United Kingdom

579,149. **Apparatus for the Manufacture of Non-Metallic Collapsible Tubes.** Viscose Development Co., Ltd.
 579,213. **Vulcanizing Process and Apparatus for Applying Patches to Fire Hose.** Kautex (Plastics), Ltd., and E. E. Parker.
 580,331. **Injection Molding and Compression Molding Presses for Thermosetting Resins.** T. H. & J. Daniels, Ltd., and M. Freund.
 580,407. **Apparatus for the Production of Polymers.** Standard Oil Development Co.

UNCLASSIFIED

United States

2,408,043. **Fire Hose Reel.** C. C. Calabrese, Webster Groves, Mo., and J. S. Herold, Greenwich, Conn.
 2,408,126. **Apparatus for Inflating Tires.** G. C. Schule, Buenos Aires, Argentina.
 2,408,243. **Hose Coupling.** J. G. Vartanian, Hanford, Calif.
 2,408,693. **Implement for Applying Nipples to Nursing Bottles.** M. H. Sidebotham, Newton, assignor of one-half to H. M. Russell, Chelsea, both in Mass.
 2,408,746. **Device for Determining the Diameter of the Tread of a Tire in the Plane of the Wheel.** R. W. Evert, Detroit, Mich., assignor to United States Rubber Co., New York, N. Y.
 2,408,976. **Tire Inflating and Testing Device.** J. Forbragd, Garden City, S. D.
 2,409,283. **Coupling for Plastic Tubes.** J. L. Hudson, Detroit, Mich.
 2,409,410. **Bead Lock Ring.** C. E. Zarth, assignor to Wingfoot Corp., both of Akron, O.

Dominion of Canada

436,385. **Pipe Attachment for Conveying Liquids from and into a Flexible Non-Metallic Container through an Opening in a Side Wall of the Container.** Imperial Chemical Indus-

tries, Ltd., London, assignee of L. Shakesby and S. H. Smith, both of Wolverhampton, Warwickshire, both in England.
 436,674. **Magnetic Fixture.** Wingfoot Corp., assignee of W. H. Taylor, both of Akron, O., U.S.A.
 436,695. **Dual-Tire Compensation Valve.** P. E. Bouffard, Matane, P. Q.
 436,805. **Apparatus for Detecting Faults in Motor Vehicle Tires and Road Wheels.** J. B. Crosby, Stockport, Chester, England.
 436,864. **In a Counter-Rotating Propeller Assembly, Electrical Heating Means for the Propeller.** B. F. Goodrich Co., New York, N. Y., assignee of W. H. Hunter, Lakewood, O., both in the U.S.A.

United Kingdom

579,084. **Pneumatic Tube Carriers.** W. A. Edward's.
 579,355. **Preparation of Surfaces for Adhesion.** Ltd., and A. M. Jamieson.
 579,386. **Firing Mechanism of Automatic Guns.** Dunlop Rubber Co., Ltd., and H. W. Trevas.
 579,395. **Hose Couplings.** F. G. L. Brissman.
 579,838. **Pipe and Cable Couplings.** R. A. W. Spooner.
 580,199. **Budding and Like Knives.** Needham, Veall & Tyzack, Ltd., and W. H. Middleton.
 580,204. **Girdle Track Attachments for Resilient Tires.** Aveling-Barford, Ltd., and W. M. Henderson.
 580,263. **Tire-Inflating Valves.** A. G. Barrett.
 580,318. **Connectors, Couplings, or Stoppers for Tubes and Pipes.** J. Shaw.
 580,336. **Holders for Coiled Hose and the Like.** National Fire Protection Co., Ltd., and N. A. J. Hedges.
 580,525. **Fabrics for Balloon Casings.** B. J. Hagood, D. A. Harper, and Imperial Chemical Industries, Ltd.
 580,608. **Controlling the Tension of a Strand.** United States Rubber Co.

CALENDAR

- Dec. 2-6. **American Society of Mechanical Engineers. Annual Meeting.** New York, N. Y.
 Dec. 2-7. **Seventeenth National Exposition of Power & Mechanical Engineering.** Grand Central Palace, New York, N. Y.
 Dec. 3. **Los Angeles Rubber Group, Inc. Christmas Party, El Capitan Theater.** Los Angeles, Calif.
 Dec. 4. **Ontario Rubber Section. C.I.C. University of Toronto.** Toronto, Ont., Canada.
 Dec. 6. **Boston Rubber Group. Christmas Party.** Copley Plaza Hotel, Boston, Mass.
 Dec. 13. **New York Rubber Group. Christmas Party.** Hotel McAlpin, N. Y.
 Dec. 13. **Detroit Rubber & Plastics Group, Inc. Detroit Leland Hotel.** Detroit, Mich.
 Dec. 20. **Chicago Rubber Group. Ladies' Night Christmas Party.** Morrison Hotel, Chicago, Ill.
 Jan. 14-17. **National Materials Handling Exposition. Public Auditorium.** Cleveland, O.
 Jan. 15-31. **March of Dimes.**
 Jan. 23-26. **Low-Pressure Division Society of the Plastics Industry, Inc. Edgewater Beach Hotel.** Chicago, Ill.
 Jan. 25-31. **Plastics Show and Convention. Society of Plastics Engineers. Navy Pier and Congress Hotel.** Chicago, Ill.
 Feb. 4. **Los Angeles Rubber Group, Inc. Mayfair Hotel.** Los Angeles, Calif.

580,613. **Tire Rim.** Firestone Tire & Rubber Co.
 580,718. **Connection Devices for the Ends of Conveyer Belts.** Mastabar Belt Fastener Co., Ltd., and B. Tebb.
 580,774. **Valves and Valve Seats.** Tecalemit, Ltd., and G. C. S. Le Clair.
 580,821. **Electric Connection Device of the Plug and Socket Type.** Dunlop Rubber Co., Ltd., and H. W. Trevas.
 580,868. **Driers for Yarns or Cords.** United States Rubber Co.
 580,901. **Shaft Couplings.** Dunlop Rubber Co., Ltd., and J. C. Hickman.
 580,903. **Attachments to Cycles for Use in Inflating Tires.** L. Lacoste.
 580,918. **Method of Attaching a Machine or the Like to a Supporting Base.** Dunlop Rubber Co., Ltd., H. Wilson, and T. E. H. Gray.
 580,954. **Electric Marine Cable Strippers.** A. P. Anello.

TRADE MARKS

United States

422,941. **Wishbone.** Footwear. Scholl Mig. Co., Chicago, Ill.
 422,961. **Arrazin.** Synthetic resin simulated leather. B. F. Goodrich Co., New York, N. Y.
 422,964. **Chem-Stamps.** Rubber hand stamps. Chem-Stamps, Bayonne, N. J.
 422,982. **The word: "Resistoflex"** superimposed over the letter: "R." Resistoflex Corp., Belleville, N. J.
 423,007. **Sheerset.** Synthetic finishing resins for stiffening and control of stretching, shrinking, color fastness of textiles. American Cyanamid Co., New York, N. Y.
 423,012. **Dolcis.** Footwear. Upson's, Ltd., London, England.
 423,027. **Philadelphia Rubber Works.** Reclaimed rubber. Philadelphia Rubber Works Co., Akron, O.
 423,057. **Billco.** Footwear. W. Cohan, Chicago, Ill.
 423,061. **Representation of a label with the words: "Rustines."** Tire repair patches. Louis Rustin, Clichy, France.
 423,090. **Sunoco.** Windshield wipers. Sun Oil Co., Philadelphia Pa.
 423,092. **Evenrun.** Abrasives. Minnesota Mining & Mfg. Co., St. Paul, Minn.
 423,093. **Representation of three oak trees and the words: "Warren's."** Bloomer elastic, narrow elastic, dress shields. Warren Featherbone Co., Three Oaks, Mich.
 423,103. **Point-a-Vue.** "It all depends on the point of view!" Foundations. E. Kadison, Detroit, Mich.
 423,112. **Gracey.** Foundation garments and raincoats. Plymouth Wholesale Dry Goods Corp., New York, N. Y.
 423,139. **Steelcord.** Tires and tubes. Firestone Tire & Rubber Co., Akron, O.
 423,140. **"Expandable."** Foundation garments. Jane Engel, Inc., New York, N. Y.
 423,141. **Paron.** Shower curtains. Para Mfg. Co., Inc., Newark, N. J.
 423,157. **Representation of a girl diving, with the word: "Curtis."** Foundation garments. Curtis Foundations, New York, N. Y.
 423,211. **Plast-O-Comfort.** Arch supports. Scholl Mfg. Co., Inc., Chicago, Ill.
 423,218. **Airborne.** Footwear. Milius Shoe Co., St. Louis, Mo.
 423,248. **Buxite.** Abrasives. Connecticut Research Foundation, Stratford, Conn.
 423,275. **Kriston.** Raw thermosetting resins. B. F. Goodrich Co., New York, N. Y.
 423,332. **Zipikins.** Baby pants. Goodyear Rubber Sundries, Inc., New Haven, Conn.
 423,351. **Raincraft.** Raincoats. Londontown Mfg. Co., Baltimore Md.
 423,352. **Brappoil.** Oil used in manufacturing rubber substitutes. Industrial Oil Products Corp., Los Angeles, Calif.
 423,395. **Lady Rochester.** Foundations and rubber gloves. Neisner Bros., Inc., Rochester, N. Y.
 423,441. **Helsyn.** Synthetic rubber sleeves for insulating. Hellermann Electric, Ltd., Oxford, England.
 423,470. **Dur-A-Lon.** Shower curtains. A. L. Siegel Co., Inc., New York, N. Y.
 423,490. **Nap-Hold.** Sanitary belts. S. A. Harrison, Omaha, Nebr.
 423,508. **SteelLastic.** Transmission mounts. Anchor Rubber Products, Inc., Cleveland, O.
 423,511. **Tygon.** Plastic setting material. United States Stoneware Co., Akron, O.
 423,513. **Representation of a bull dog and a dog collar with the words: "Boston Woven Hose and Rubber Company,"** written thereon. This is all superimposed upon a square with an arrow and the words: "Bull Dog." Boston Woven Hose & Rubber Co., Cambridge, Mass.
 (Continued on page 444)

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OTS Bibliography Reports on Rubber Products—V

THE printing of abstracts of these reports on rubber and rubber products from the Department of Commerce's "Bibliography of Scientific and Industrial Reports" was started in the June, 1946, issue of INDIA RUBBER WORLD as a service to our readers since it was believed that the circulation of the Department of Commerce publication was not duplicating that of INDIA RUBBER WORLD to any considerable extent. We are still convinced that this condition is essentially true. However the amount of material that has become available for republication is so large that for practical reasons, in order to continue this service, it will be necessary to eliminate some of what are considered to be the less important of these abstracts and to reprint this material in smaller type in a manner somewhat similar to our listing of the latest United States and British patents.

The "Bibliography of Scientific and Technical Reports," which lists reports received from civil and military agencies of the United States Government and from cooperating foreign governments and covers a wide range of subjects in addition to rubber and rubber products, is issued weekly by the Department of Commerce, Office of Technical Service. The Bibliography is sold by the Superintendent of Documents, Government Printing Office, Washington, D. C., on a subscription basis, \$10 for one year. Complete reports either on microfilm or as photostats, as indicated below, may be obtained from the Department of Commerce.

Manufacture of Hard Rubber Parts for Storage Batteries and Battery Ventilating Equipment for German Submarines. S. P. Fisher. (CIOS Item 1212, File XXXII-81.) PB 9675, 1945. 26 pages. Photostat \$2; microfilm 50¢. This report covers primarily the methods of manufacturing rubber parts used in the construction of storage batteries and battery compartment ventilating equipment for German submarines. All data on special equipment have been incorporated. In some cases rubber, owing to its scarcity, was being or had been recently replaced by other materials; so the molding and manufacturing methods used on the substitute articles are also covered. Information on the manufacture of rubber parts for torpedo batteries is included. Also recorded is some interesting work done on submarine jars of phenol plastic material. Diagrams.

Bogie Wheel, Rubber, Shear Cushion, Resilient Type. C. W. Kynock and others. (Chief of Ordnance, Development Division, Detroit, Project Report G-09-7.) PB 3082, 1944. 14 pages. Photostat \$1; microfilm 50¢. A report on the shear cushion, resilient type, rubber bogie wheel as tank equipment is given, which includes correspondence with The B. F. Goodrich Co. and photographs and drawings. The purpose of the wheel was to alleviate severe shock loadings imparted to a tank bogie tire when used with steel tracks. The conclusion reached was that this type-wheel is not practical and that more natural rubber would be required to operate a tank on conventional bogie wheels.

Second Report on 7.50x20, S4 Synthetic Tires, Test A-36 and 32nd Report on Ordnance Program No. 5747. E. J. Murray. (Ordnance Research and Development Center, Project 4348-7, 12-25. Aberdeen Proving Ground Project.) PB 3077, 1944. 52 pages. Photostat \$4; microfilm \$1. This document contains a collection of report sheets on various tests made on the 7.50x20, S4 synthetic tires in order to determine their general service durability while operating 2½-ton GM Co. trucks carrying five-ton payloads. Conclusions reached and recommendations in regard to these tires are given. Photographs also appear.

Interrelations of Sol and Gel in GR-S Polymers. W. O. Baker, R. W. Walker, and N. R. Pape. (Report presented at the CR-Meeting, ORD, New York, March 14, 1944. WPB, Office of the Assistant Rubber Director for Research and Development of Synthetics, General Report 16.) PB 9687, 1944. 41 pages. Photostat \$3; microfilm 50¢. The ultimate processibility of a variety of commercial GR-S rubbers was evaluated by 25° C breakdown on hand-tight rolls. Toughest gels (GR-S-85) were completely converted in three minutes into sols. Thus practical processing has the background that virtually all commercial GR-S can be broken down. Sol-gel data, given in 10 graphs, confirms quantitatively that mill breakdown is the predominant chain scission reaction. Inherent

quality of GR-S polymers can be utilized in the final stocks, such as tires only by precise compromise of mildest hot processing with mixing and plastication necessary for extrusion and molding.

Measurement of Viscosity of GR-S Solutions. W. O. Baker and J. W. Mullen, II. (WPB Office of Assistant Rubber Director for Research and Development of Synthetics, General Report 14.) PB 9685, 1944. 23 pages. Photostat \$2; microfilm 50¢. GR-S sols are accurately characterized by their dilute solution viscosities, when the experimental variables are adequately controlled. Such viscosities are, therefore, a factor in quality control. The relative viscosity, η_r , of solutions of GR-S polymers is markedly decreased with increase of the shearing stress, in capillary viscometers. This point is further evidence of large-shape anisotropy or chain-like structure of soluble GR-S molecules. A type of viscometer is described, suitable for investigation of the effects of capillary radius and length on the flow of GR-S solutions. The term $\frac{\eta_r}{c}$ decreases as

c increases, up to 10 or 15% solutions of essentially linear polymers. But, for branched or netted particles, $\frac{\eta_r}{c}$ may show zero or positive slope when plotted against c . This point provides a first approach to detection of branching or marked non-linearity in GR-S polymers.

Concentrated solution or dispersion viscosities (1-15% range) furnish most delicate information on non-linearity or flow properties of raw polymers. For example, for two GR-S polymers whose Mooney reading differed about 6%, the concentrated solution viscosities differed about 214%. Diagrams of apparatus, and tables and graphs showing results obtained are included.

Analysis of GR-S Latex by Light Scattering. P. P. Debye. (WPB Office of Assistant Rubber Director for Research and Development of Synthetics, General Report 12.) PB 9683, 1944. 58 pages. Photostat \$4; microfilm \$1. Light scattering can be used as a method for the determination of particle sizes in colloidal solution. The phenomenon can be explained as an interference effect, and in this particular investigation it has been used to give information about the diameters of latex particles, which generally are considered spherical. The phase differences of light rays coming from different parts of a small particle will never be appreciable; thus a symmetrical angular intensity distribution of the scattered light will be observed. In the case of larger particles the phase differences of the scattered light rays are appreciable and will become larger the larger the scattering angle, which is measured against the direction of the primary parallel light beam. A study of these intensity distributions of latices of different polymerization times has been made, and corresponding latex-particle diameters have been evaluated. The results can be expressed qualitatively in saying that in the first hour or two of the polymerization, particle diameters increase rapidly until they reach a maximum, then gradually decrease to a minimum at about 2½ polymerization time and then show possibly a slight rise toward the end of the polymerization period. A second method of size determination, based on a theoretical equation for turbidity developed by P. P. Debye, has also been applied. A comparison of the two methods shows what diameters resulting from angular distribution measurements are slightly larger, but of the same order, than those obtained by the second method. The report contains photographs, diagrams, tables, and graphs.

Light Scattering in Solutions. P. Debye. (WPB Office of Assistant Rubber Director for Research and Development of Synthetics, General Report.) PB 9673, 1944. 17 pages. Photostat \$2; microfilm 50¢. The scattering of light in solutions becomes more prominent the smaller the number of ultimate particles is in which a definite amount of solute has been broken up in the course of the solution process. Since with increasing intensity experimental procedures for the observation of the scattering become easier to handle, the application of methods of optical analysis to solutions of polymers seems appropriate. This report deals with some of the conclusions which can be drawn from the results of such measurements. The light scattering in colloidal solutions depends primarily on an interference effect originating at the suspended particles. The quantity characteristic for such an effect is the quotient of a length measuring the size of the particle and the wave length of primary light. Light scattering experiments furnish an easy method of determination of high molecular weights. This paper was also published in the *Journal of Ap-*

plied Physics, April, 1944, pages 338-42. A different abstract than the above also appeared in INDIA RUBBER WORLD, December, 1943, page 267.

Depolarization in Diluted Solutions. P. Debye and E. S. Elyash. (WPB Office of Assistant Rubber Director for Research and Development of Synthetics, General Report 7.) PB 9679, 1944. 13 pages. Photostat \$1; microfilm 50¢. In a report by P. Debye, "Scattering of Light in Solutions" (PB 7678), a formula was developed for expressing the scattered intensity, and a method for determining the constant ρ in a special case was formulated by calculating the fluctuations in concentration by a general statistical method which involves the evaluation of the work which has to be supplied to the solution to change its concentration. If we want to analyze the general case in the same way, we must look out for a reversible way of changing the isotropic element of volume of the solution into an anisotropic state, which change can be done with the help of electric and magnetic fields which induce double refraction. However the experimental arrangement is rather involved, and from a practical point of view it seems advisable to follow another method of calculation, which has the disadvantage that it can only be applied to dilute solutions. On the other hand it requires nothing more than the observation of the depolarization coefficient in a direction perpendicular to the primary beam. This method is explained in this report.

Molecular Weight Distribution from Turbidity Measurements. P. Debye. (WPB Office of the Assistant Rubber Director for Research and Development of Synthetics, General Report 17.) PB 9688, 1944. 15 pages. Photostat \$1; microfilm 50¢. A highly theoretical consideration as to the relation between molecular weight distribution and turbidity (fractional loss of intensity per cm.) can be summed up in the following manner: If the reciprocal specific turbidity is plotted as a function of the polymer concentration, for every concentration the corresponding value of ψ can be read which is a function of the concentration and is independent of the individual particle masses. If a mixture is analyzed in this way and the specific turbidity itself (not its reciprocal) plotted as a function of ψ , then the coordinates of the curve so obtained are represented in form of a power of series of ψ , the coefficients of which are the moments of the distribution curve.

Scattering of Light in Solutions. P. Debye. (WPB Office of Assistant Rubber Director for Research and Development of Synthetics, General Report 6.) PB 9678, 1944. 16 pages. Photostat \$2; microfilm 50¢. Observations of the intensity of scattering can be used as a method for the determination of molecular weights. This method is especially appropriate in the case of high molecular weights. This note deals with the underlying theory and is divided into two parts. In part A the scattering intensity is calculated for a volume in which the index of refraction undergoes irregular fluctuations. This part is just an application of Maxwell's electromagnetic theory and proceeds along the line followed by A. Einstein. In part B the strength of the fluctuations is calculated, using a statistical method which again is essentially the same as that used by Einstein. Combination of the results of parts A and B leads to a formula for the intensity of scattering as a function of the concentration, which shows that an intimate connection exists between the scattered intensity and the osmotic pressure of the solution. The relation in question therefore leads to a method for the determination of molecular weights, which does not involve any empirical constants of the kind which have to be introduced, i.e., in Staudinger's viscosity method.

Instructions for the Determination of Gel Content, Swelling Volume of Gel, and Intrinsic Viscosity of Sol in GR-S. WPB Office of the Rubber Director. Polymer Research Branch. PB 9682, 1944. 10 pages. Photostat \$1; microfilm 50¢. The purpose of these instructions is to provide a set of directions for the determination of gel, swelling volume, and intrinsic viscosity in GR-S and to indicate what procedures should be followed in sampling and in preparation of the sample. No attempt is made to go into detail in regard to the techniques involved. Reference should be made to the original reports, which are listed for this information. An appendix discusses cleaning the gel apparatus, and determination of the weight of the benzene film. Diagrams are given of the rubber extractor and Ostwald viscosimeter.

(To be continued)

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MAINTENANCE DATA SHEET NO. 8

CALIBRATION - INCLINE-PLANE

To check calibration of the IP-4 machine, weigh the carriage complete with all attachments (clamp, pen and weights for range to be checked). Carriage should weigh exactly twice the effective capacity (i.e. a 10-lb. cap. carriage should weigh 20 lbs.). On the IP-2, a 250-gram capacity carriage, complete with attachments, should weigh 591.51 grams—other capacities in same proportion. (A carriage weight should weigh an amount equal to the required capacity divided by the sine of the angle of maximum inclination.)

After determining that carriage weight is correct, see that rims of wheels and tracks are smooth and free of all dirt, rust, etc. Place carriage on track midway of its run. Adjust pen to rest in O horizontal on the chart. Then start the plane inclining. The line drawn will start vertical—indicating combined starting friction and inertia—but should move away from the vertical within the first two small spaces in the chart to indicate a satisfactory calibration.

If it does not, proceed as follows:

1. See that pen point is in good mechanical condition and sliding freely.
2. With commercial solvent and soft rag clean foreign materials from wheels and track.
3. Check tracking of wheels.
4. Remove wheels and wash ball bearings; re-pack per instructions.
5. Plain-bearing Wheels: Check condition of pivots, and indentation in axle and point in frame.
6. In replacing either type bearing, take care not to restrict rotation of wheel.
7. Check track alignment; tracks must be parallel and in same plane.

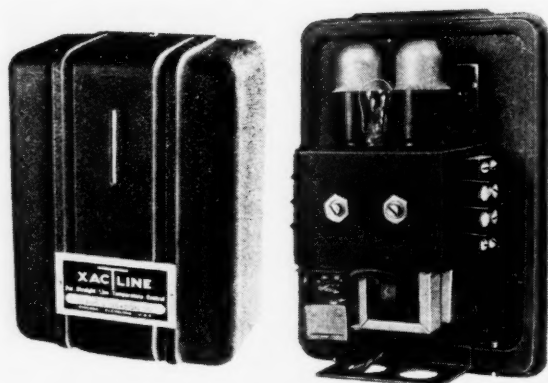
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Xactline Model 1-HA Temperature Control

Temperature Control Unit

THE new Xactline Model 1-HA temperature control, made by Claud S. Gordon Co., is said to provide unusually close temperature-variation control, with variation as low as 0.2° F. and power "on-off" cycles as short as three seconds. An anticipator-type "straight line" control, the Xactline operates in conjunction with conventional millivoltmeter or potentiometer-type controlling pyrometers. The control has no gears, cams, motors, bearings, valves, shafts, or other rotating or sliding parts. The unit consists of five basic components with only one moving part, an internal relay, and is factory tested for immediate operation.

The control is stated to be a solution of costly overshoot or undershoot temperature variations prevalent in the plastic, molding, tempering, and other heat processing fields. It will perform efficiently on any type of electrically heated furnace, oven, molding machine, etc., using conventional controlling pyrometers, or gas-fired equipment employing solenoid-controlled or motor operated valves. The control, housed in a cast aluminum case 8 1/4 inches high, 6 1/4 inches wide, and three inches deep, is designed for surface mounting installation, with only six connections to be made to put the instrument into operation.



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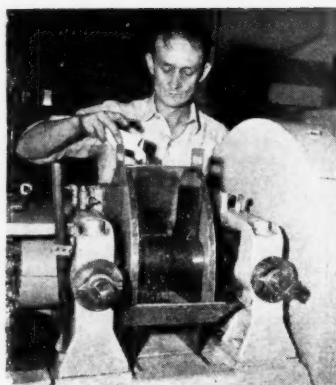


SCHUSTER CALENDER GAUGE

... IT CAN NOW BE EQUIPPED WITH AUTOMATIC CONTROL

NEW—and more valuable than ever. For the past 13 years The Schuster Calender Gauge has proven itself an outstanding and indispensable instrument in the rubber industry. Now it automatically adjusts your rolls to a predetermined thickness and correctly maintains that thickness. Coatings for tire fabric and similar uses are kept accurate and uniform automatically. The result is a better product at a lower cost. Write us today for complete particulars.

THE MAGNETIC GAUGE COMPANY
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Eastern States Representative—
BLACK ROCK MANUFACTURING CO., Bridgeport, Conn.



Goodrich Hood in Use on Laboratory Mill

cellulose acetate. A loading chute, also made from cellulose acetate is built into one side and directed so that pigment drops into the bank. The hood rests on the mill guides and clears the pan by about 1/4-inch so that pigment dropping into the pan can be collected on a sheet of paper, withdrawn and fed again to the batch through the spout without moving the hood.

Hood for Laboratory Mill

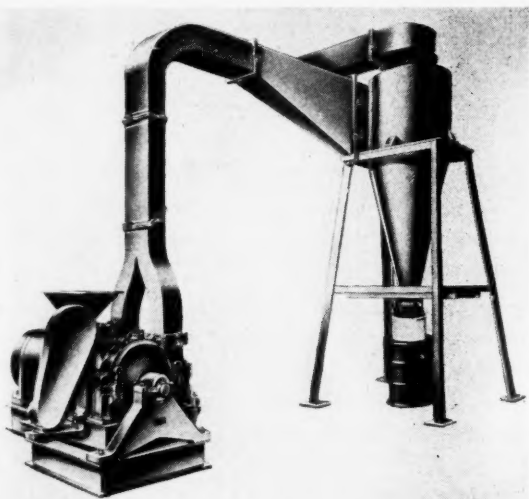
THE synthetic rubber research laboratory of The B. F. Goodrich Co., Akron, O., has designed a simple hood for a four-by-seven-inch mill to prevent fluffy pigments from flying around the room and to prevent loss of bits of rubber when extremely tough polymers are being milled. The side panels of the hood are made from 16-gage sheet metal cut to fit around the mill guides and rolls. The center section is made from 1/8-inch thick transparent cellulose acetate.

New Screenless Pulverizer

A NEW No. 8 Mikro-Atomizer, capable of producing ultra-fine powders in the range of one micron to 25 microns (under 325 mesh) in size, in large production quantities, has been announced by the Pulverizing Machinery Co. Using a 75 h.p. motor, this new screenless pulverizer is particularly applicable to tonnage operations. Capacities in the range of 2,000 to 8,000 pounds per hour, depending on the material being ground, are obtainable with this unit.

Although having about four times the capacity of the No. 6 model introduced two years ago, the new unit retains all the features and basic principles which have made these pulverizers so popular. Guaranteed control of particle size is offered, as with the smaller machine, and operating temperature seldom exceeds 115° F. Compact and efficient, the No. 8 Mikro-Atomizer discharges into a stainless steel dust collector. Rotary air lock for continuously discharging material from the cyclone is supplied. A number of modification of the No. 8 machine are available to accommodate the wide range of different materials for which it is recommended.

(Continued on page 418)



New No. 8 Mikro-Atomizer Grinding Machine

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{ ACCELERATORS PLASTICIZERS ANTIOXIDANTS }

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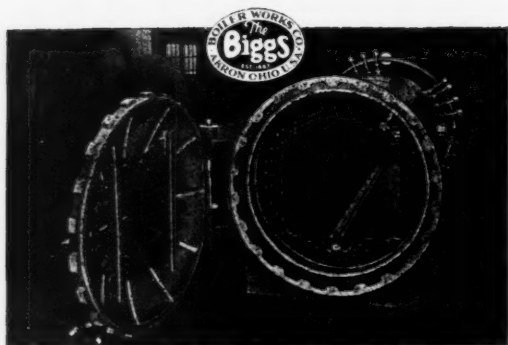


Fig. 47. Biggs vulcanizer with special heating manifolds and circulating fan; all sizes, various working pressures.

BIGGS Vulcanizers are Standard Equipment in the Rubber Industry

Biggs-built vulcanizers and devulcanizers have always had a prominent place in the development of the rubber industry. For over 45 years Biggs has furnished single-shell and jacketed vulcanizers both vertical and horizontal, as well as many different types of devulcanizers. Biggs modern all-welded units with quick-opening doors are available in all sizes and for various working pressures—with many special features.

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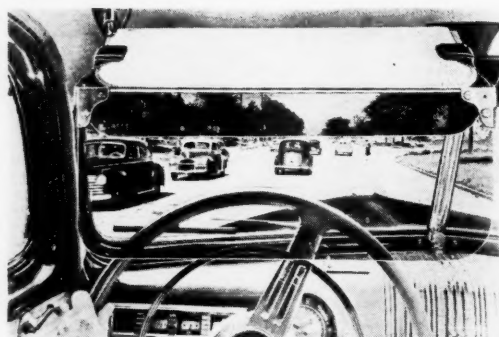
GR-S Synthetic Latexes

By Appointment of Office of Rubber Reserve

BRANCHES AND SALES REPRESENTATIVES

Charles T. Wilson Co., Inc., United Bldg., Akron, Ohio
Ernest Jacoby & Co., 79 Milk St., Boston, Mass.
Reinke & Amende, Inc., 1925 East Olympic Blvd., Los Angeles, Cal.
Charles T. Wilson Company (Canada) Ltd., 406 Royal Bank Building,
Toronto, Canada

New Goods and Specialties



Two-Shield Plexiglas Driving Visors in Use Showing Reduction in Glare

Glare-Removing Driving Visor

MOTORISTS can now be spared harmful, annoying glare from road and sky by using a new Plexiglas visor, designed by the Earl A. Thompson Mfg. Co., which is quickly and easily installed on automobiles. Called the O-Q visor (for optical quality), the new driving aid is available with either one or two shields of shatter-resistant Plexiglas in special smoky green colors. The single shield model eliminates ordinary road glare; while the two-shield model can be adapted to provide driver comfort for day or night driving. The visor is attached to the car's usual sun visor by clamps, and each shield, separately mounted, is easily adjusted with a flick of the finger.

Three models have been designed to fit any automobile. In the two-shield model the larger lens eliminates road glare; while the smaller one cuts off sky glare. If sky glare or glare caused by sunlight or snow is extremely intense, both lenses may be combined to form an effective glare filter. With a moderate amount of road glare, the larger denser lens alone is sufficient. For night driving the smaller lens can be used to filter out glare from oncoming headlights. Although night visibility is satisfactory through this lens, it should be used merely to eliminate the brightness of approaching headlights, not to shield the driver's whole range of vision.

The Plexiglas visor does not interfere with the normal uses of the car visor, it is claimed. When direct sunlight enters the side window, the car visor can be turned to side position as usual, and additional protection can be secured by turning down the O-Q visor to cover window space below the car visor. The new visor can be installed in a few minutes. The metal frame is held in the proper position on the car visor; the supporting jaws tightened with pliers, and the additional clamps forced over the jaws. The visor is then permanently fixed, ready for all driving uses.

Molded Latex Playthings

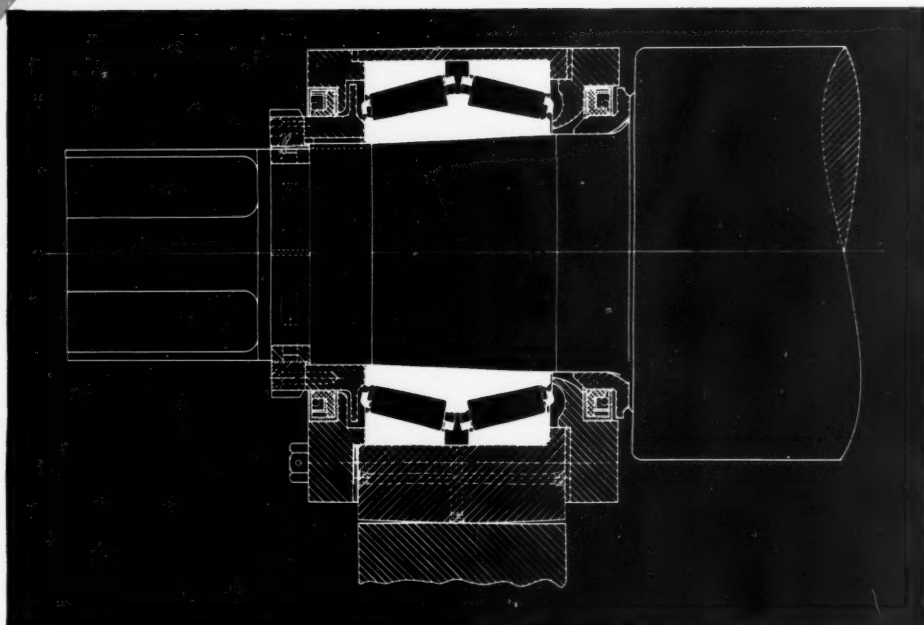
A NEW line of rubber Joy Toys has been introduced by Molded Latex Products, Inc. Made of neoprene latex molded by the Kaysam process, the toys are said to be educational, virtually indestructible, and easy to sterilize. They are available in the form of animals, fish, birds, and ships, all furnished in yellow, pink, or blue harmless colors. All are molded in lifelike contours with appealingly humorous touches. The basic colors are compounded into the latex, and surface painting is used only for eyes and minor decorations.

This family of toys includes a floating duck, duckling, fish, submarine, spouting whale, lamb, bunny, elephant, hippo, pony, puppy, and many others, all containing a metal whistle. The submarine has a squeakhole to permit entrance of water and allow the toy to perform realistically under water. The miniature whale spouts realistically when the toy is pressed after water has been injected through the squeakhole. For

THIS TIMKEN BEARING APPLICATION

Assures

**ALL THE BEARING QUALITIES
NEEDED IN RUBBER CALENDERS**



First, because the bearings themselves are manufactured to extremely close precision tolerances.

Second, because the bearings are of Balanced Proportion Design, giving increased roll neck strength and rigidity; minimum roll deflection; and maximum radial, thrust and combined load capacity.

Third, because the bearings are mounted with a tapered bore on the calender roll shaft, making it much easier to assemble the bearings on the roll shaft and to remove them when necessary.

Fourth, because the calender rolls can be ground on the bearings, making the O.D. of the calender rolls virtually free from inaccuracies, due to the internal precision of the bearings.

Fifth, because Timken Tapered Roller design assures free rolling motion regardless of the R.P.M. of the bearing or the speed of the calender rolls.

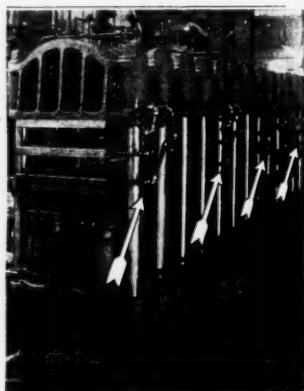
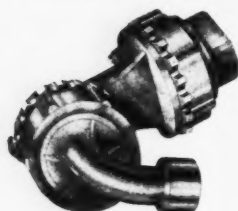
Sixth, because only with an adjustable bearing—a Timken Bearing—is it possible to provide and maintain proper running clearance for any calender operating temperature. These features make possible accurate and constant gap setting between rolls with resulting close control of product thickness; minimum operating and maintenance costs; and longer calender life. Specify Timken Bearings for your calenders and look for the trade-mark "TIMKEN" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

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TAPERED ROLLER BEARINGS

*48 Years of Engineering and
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THE FLEXIBILITY OF HOSE with the
SAFETY and RIGIDITY OF PIPE....

FLEXO JOINTS



Massive steam platens on these presses are connected with Flexo Joints.

Flexo Joints are sturdy, simple, and accurate in their construction — they feed pressure, vapors, and fluids—entirely unrestricted—to moving parts. Fully enclosed from grit and dirt. Simple construction—no springs, or small loose parts, and no ground surfaces to wear.

Full 360° range of movement. Handles all pressures from gravity up. Four styles for pipe diameters $\frac{1}{4}$ to 3". Write for specifications and prices on Flexo Joints.

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does not mean cotton fiber alone

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over twenty years catering to rubber manufacturers

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acknowledged superior by all users are important and valuable considerations to the consumer.

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CLAREMONT WASTE MFG. CO.

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The Country's Leading Makers



Rubber Joy Toys: Submarine, Duckling, Elephant, Fish, Pony, Bunny, Puppy, and Hippo

sanitary reasons, the toys are packaged in cellophane either individually or in sets of three. These playthings will be appreciated by parents not only for their entertainment value, but because they can be kept sanitary by sterilization in boiling water.

Screenless Pulverizer

(Continued from page 414)

The basic principle of operation lies in separating and recirculating the ground particles by a balanced reaction between centrifugal force and air flotation or aerodynamic drag in such a way that the smaller particles which meet the size specification are discharged from the mill, while the larger sizes are retained in the grinding section for further reduction. The mill is of duplex construction insofar as it has a dispersion ring, separator wheel and fan on each side of the single centrally located rotor, but all are assembled on a single drive shaft and one composite housing.

The entire mill housing assembly is split into halves; the upper half swings easily on hinges. The rotating members, all on one shaft, may then be lifted away from the lower housing. All parts which contact the material being ground are highly finished for quick cleaning. Stainless steel construction of the rotating members eliminates corrosion and contamination. Body castings are all special nickel-iron alloy, which takes a high polish and is very resistant to corrosion. Approximate dimensions of the machine proper (without cyclone or piping) are eight feet by seven feet by $5\frac{1}{2}$ feet.

"Engineering, Operating and Maintenance Data on Leslie Pressure Reduction Valves." Leslie Co., Lyndhurst, N. J. 20 pages. This illustrated bulletin gives design, installation, operating and maintenance data on the company's line of pressure reducing, differential, and overflow valves for steam, air, or gas service.



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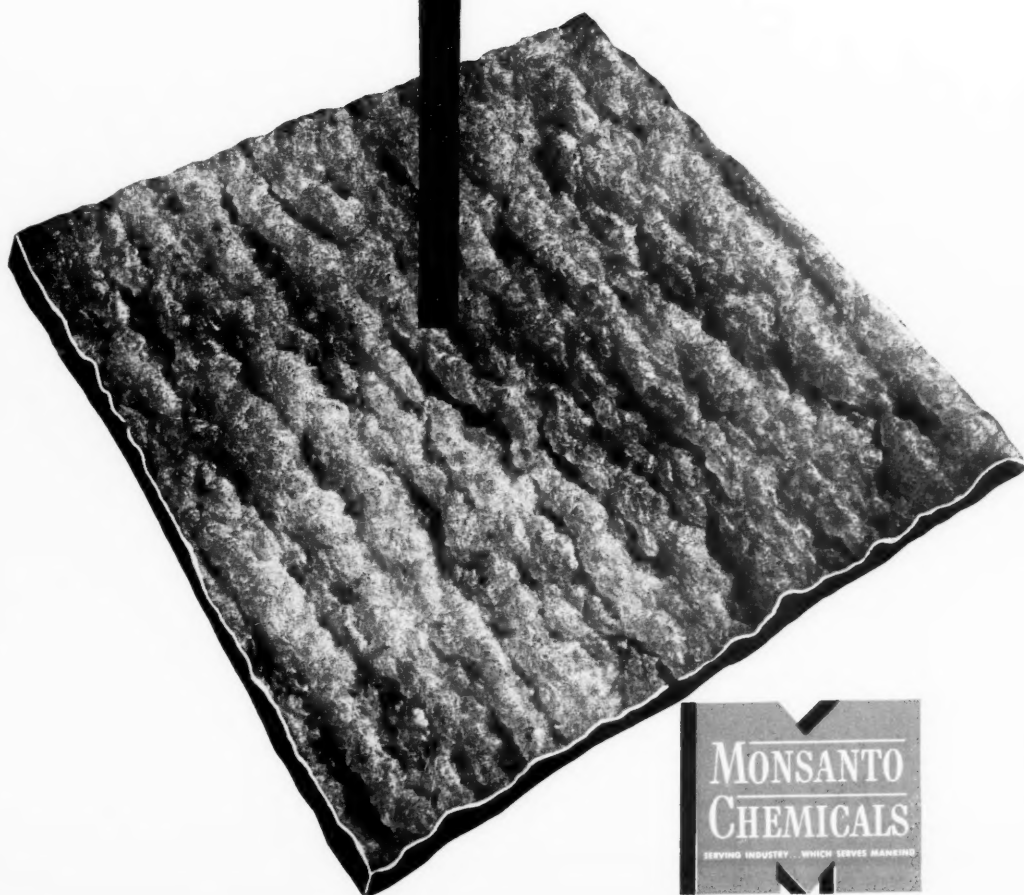
FOR FURTHER DETAILS, SEE AD ON PAGE 304

Monsanto accelerator santocure natural rubber

Long before the war brought on synthetic rubber, Santocure had gained outstanding recognition as an accelerator for rubber and reclaimed rubber. What plant men like about Santocure (then and now) was the safe handling it provides—the way it performs under a wide range of plant conditions, through choice of activators—the way it handles in high black stocks.

Now, with rubber back in the picture, Santocure is doing a double job—curing synthetics—and curing natural rubber just as in pre-synthetic days.

Continuing research studies on many rubber products, together with literature describing the properties and applications of Santocure are available. Write MONSANTO CHEMICAL COMPANY, Rubber Service Department, Second National Bank Building, Akron, Ohio.



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The New Stabilizer V-1-N

**Stabilizes Vinyl Chloride Plastics
and coatings against heat and
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EUROPE GREAT BRITAIN

Reconversion to Natural Rubber

The reconversion of the British rubber industry to the use of natural rubber is proceeding at a pace necessarily more rapid in the case of some lines of goods than in others; but on the whole progress in this direction was marked from the very start; as is indicated by figures comparing the amounts of natural and synthetic rubber used in the production of the chief rubber manufactures in January, 1946, and July, 1946, respectively. The total amount of rubber so used in January was 7,717 tons, of which 4,666 tons represented synthetic and 3,051 tons, natural rubber. In July total consumption was 9,764 tons, of which synthetic rubber accounted for 2,353 tons and natural rubber, 7,411 tons.

The most immediate and important reduction occurred in the manufacture of giant tires (333 tons of synthetic rubber out of a total of 3,393 tons of rubber, against 1,575 tons out of a total of 3,193 tons) and giant tubes (two tons of synthetic rubber out of a total of 334 tons of rubber, against 130 out of a total of 275 tons of rubber). In the case of other items, as automobile tires, belting, cables, footwear, soles and heels, and hose the reduction in the use of synthetic rubber was far less drastic; and there was even a slight increase in the amounts of synthetic rubber going into motor cycle covers, covers for horse-drawn vehicles, and repair material, though when quantities were considered as percentages of total rubber used for the respective items, a different picture was obtained.

Northern Polytechnic's Golden Jubilee

The Northern Polytechnic, Holloway, London, commemorated its fiftieth anniversary with suitable celebrations. The institution, founded in 1896, is well known in rubber circles as having the only school of rubber technology in the country where full-time training for senior students is available. Rubber technology classes were given here for the first time in 1912, but before long it became apparent that reorganization was necessary, and in 1923 the school began to assume its present form. It trains students for the associateship and licentiateship of the Institution of the Rubber Industry and also for the plastics technology examination of the City and Guilds of London Institute. With the great advances made in the rubber and allied industries in recent years, even the present type of instruction is being considered inadequate, and in a commemorative brochure put out by Polytechnic it is suggested that it would benefit both the school and the rubber and allied industries if the existing department of rubber and plastics technology were in the near future to be converted into a National College of Rubber Technology, which would become the center of the most advanced instruction and training in research in the country.

On the program of the anniversary celebration was an exhibition of work at Polytechnic with demonstrations of its activities, including also demonstrations by the Department of Rubber and Plastics Technology of the manufacture of various articles in rubber and plastics, and a display of testing equipment.

I.R.I. Technical Sessions

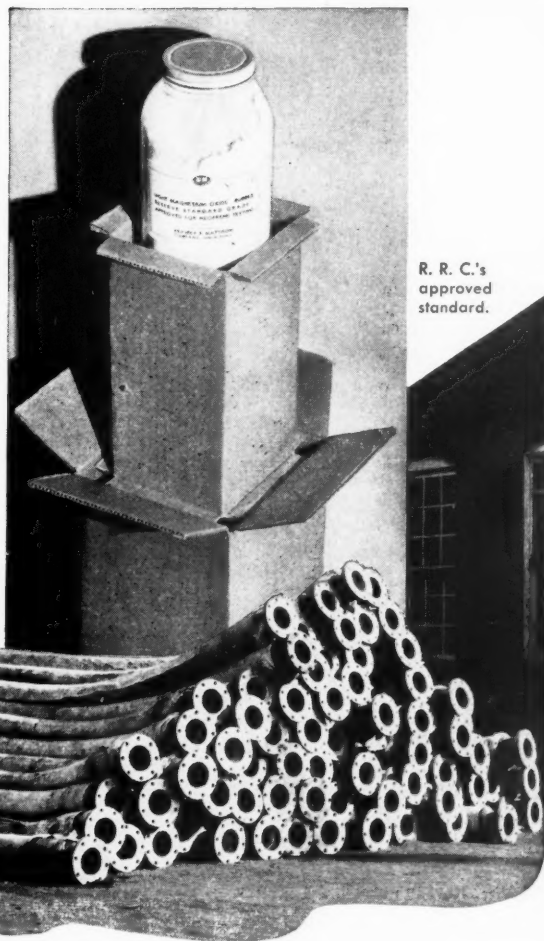
The following meetings and lectures of the Institution of the Rubber Industry were scheduled for the last quarter of 1946:

London: October 15. "A Preliminary Evaluation of Synthetics in Rubber to Fabric Adhesion," by R. C. W. Moakes. November 19. "The Clean Handling of Black," H. Wilshaw. December 17. "Silicon Rubber," G. L. Hammond.

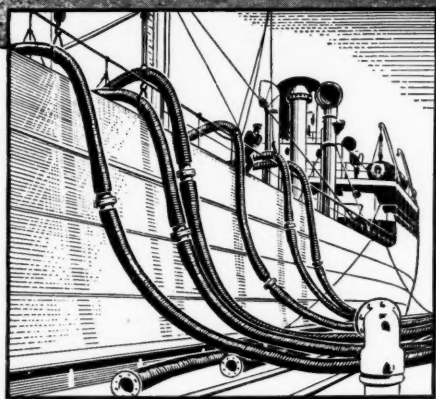
Manchester: October 28. General discussion of antioxidants, including two short papers: "The Mechanism of Antioxidant Action" by C. F. Flint, and "General Observations and Criticism of Antioxidants" by D. E. Davis. November 25. "The Impact of Plastics on the Rubber Industry" by M. Jones. December 16. Discussion of the revision of British standard specifications for vulcanized rubber.

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compounders insist on

K&M LIGHT MAGNESIUM OXIDE



R. R. C.'s
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standard.



Neoprene Oil Suction and Discharge Hose — photo
courtesy Quaker Rubber Corporation, Philadelphia.

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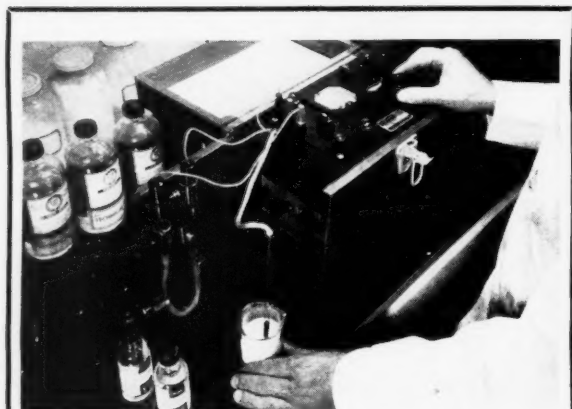
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General Offices: Cincinnati (1), Ohio

Midland Branch: October 14. "Rubber in Sports Goods," S. G. Ball. November 12. "Rubber Machinery Developments" (at Wolverhampton) by F. Siddall. December 9. Forum on electrostatic hazards in industry—(several short papers).

Leicester Branch: October 18. "Recent Advances in Rubber Technology at Leverkusen," G. L. Hammond. October 29. "A Review of the Properties and Uses of Rubber Latex," F. T. Purkis. November 20. "Rubber Compounding Ingredients," F. S. Roberts. December 16. "A Survey of Accelerators and Curing Agents," J. S. Hunter.

Southern Branch: October 10. "Rubber Compounding—Its Objects," C. W. Buckles. November 14. Discussion on Electrical Test Methods of B.S.903, by Research Association of British Rubber Manufacturers.

Preston Branch: October 14. "New Methods of Molding," S. Buchan. November 11. "Story of Vulcanization Accelerators," Fordyce Jones.

Scottish Branch: November 12. "Training within Industry," G. Tulloch.

Meeting of the R.A.B.R.M.

At the annual general meeting of the Research Association of British Rubber Manufacturers in London on September 25, A. Healey was elected president for the ensuing year; while the retiring president, Sir Harold Hartley, was elected vice president. Other vice presidents for the ensuing year include the reelected vice presidents and W. Bond and D. F. Twiss, newly elected to the office.

The annual report of the Association states that total membership in 1945 was 287 firms, consisting of 230 ordinary and 57 associate members. During the year five new ordinary members were admitted, and applications from three Australian companies for Dominion membership had been approved. Attention was called to the fact that though income had more than met expenditure in 1945, it was not expected that 1946 would show the same satisfactory result since operating costs had been rising rapidly, while income remained static. More money was needed not only to meet rising expenditures on operations, but to permit the Association to carry out its full program of research. Additional land adjoining the Association's present site at Croydon had been acquired for new headquarters and laboratories, it was further revealed. At the same time it was pointed out that while this purchase had been approved, the Board of Trade subsequently suggested that the Association attempt to select a site for its future location away from London and its environs.

New Companies Formed

The newly formed Lastex Yarn & Lactron Thread (Overseas), Ltd., will carry on the business of manufacturer of and dealer in rubber thread covered with textile fibers, elastic yarn, etc.

India Tire & Rubber Co. (Argentina), Ltd., has been registered with a capital of £30,000 in £1 shares.

Petrocarbon, Ltd., has been formed to produce chemicals from petroleum by the so-called "Catarole" process invented by Ch. Weizman, the Zionist leader. It is claimed that the new process will make it possible to manufacture from an oil which is cheap and abundant a wide range of products for use in making paints, dyestuffs, plastics, plasticizers, and the like, and certain chemicals now rare and costly will be produced on a commercial scale at low prices. The new concern has a capital of £1,800,000, half of which has been subscribed by the Finance Corp. for Industry and the other half by a group of private financial organizations. Recently an estate of 700 acres at Partington, adjoining the Manchester Ship Canal, was bought from Lord Stamford. Here it is proposed to establish a large industrial estate with, as nucleus, the plant for exploiting the "Catarole" process.

ITALY

According to a report from Rome, the government has just obtained through U.N.R.R.A., 4,500 tons of rubber which it will distribute among Italian concerns.

Pirelli lost part of its rubber stocks in a recent fire in the

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Division of United States Rubber Company

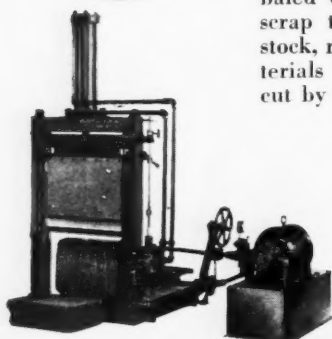
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It's advantages like these that make the "Black Rock" 4-KBW HYDRAULIC CRUDE RUBBER CUTTER the machine to use for cutting baled crude rubber, wax, scrap tires, scrap friction stock, rag rope and all materials which can not be cut by ordinary means.



- Fast—efficient—self contained.
- No lubricants needed for cutting.
- Automatic blade return.
- Cutting cycle 9 seconds (Max. stroke).
- Knife opening 30" x 20".
- Size 42½" x 83.
- Height 97".

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FULL PARTICULARS



- Small Size
- Light Weight
- One Moving Part
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Milan factory. Though the loss of raw material was not such as to force Pirelli factories to cease operation immediately, some probably would have had to close down fairly soon if fresh supplies of rubber had not become available.

Swiss sources state that the production on a small scale of waterproof nylon has been started by an Italian manufacturer. The material is finding its way into Switzerland where it is being used in the manufacture of raincoats.

POLAND

Gradually the Polish rubber industry is reviving. The rubber factories which were destroyed during the war are being rebuilt, and outputs have been increasing from month to month since the beginning of 1946, when production reached a bare 5% of the prewar level. By June, 1946, however, the rate of production was up to 20% of prewar, with expectations that it would reach 40% by the end of 1946. The important "Pepege" plant in Grudziadz was scheduled to reopen in the latter part of 1946, giving employment to 1,000 persons.

FAR EAST

INDO-CHINA

Making Tires under Wartime Conditions

Living in practically complete isolation for more than five years, rubber growers in Indo-China were repeatedly faced with problems of evolving ways and means to insure a reasonably normal life in the interior of the country, as well as continued production of important raw materials to be stored until the end of the war when they could again be shipped to Europe and America.

The problem of transportation was particularly serious, and on rubber estates a solution was sought in the use of ox-drawn wagons instead of motor vehicles. However even this method of transportation was threatened when—despite the saving in wear made possible by the use of the slow-paced ox-carts—the limited available stocks of tires began to give out. Various makeshifts were tried without much success, and on one estate, the Chup Plantations of the Compagnie du Cambodge, one of the companies of the Société Financière des Caoutchoucs, it was finally decided to attempt to make solid tires like those formerly used on heavy trucks.

Manufacture of tires along accepted lines was, of course, out of the question since the proper machinery and necessary chemicals both were lacking. But recourse was had to a process tried at Chup in 1938; it had been attempted to incorporate in latex before coagulation a part of the necessary compounding ingredients, and tests had already been made in coagulating latex after the addition of carbon black, sulfur, and sawdust. Work along these lines was resumed, and after many tests in 1943 and 1944, it was found possible to produce a satisfactory compound consisting of 100 parts rubber, 10 to 12 parts sulfur (cylinders pounded and sifted to pass through a 100 mesh), 35-40 parts of carbon black obtained in the distillation of rosin from pines, and 10 to 15 parts of fine sawdust.

As described by A. Thomas, of the Chup Plantations, in a recent issue of the *Revue Générale du Caoutchouc*, the process employed was as follows. The fillers were first mixed, dry, in a coagulating tank, then moistened and mixed to obtain a slightly liquid, homogeneous paste. The paste was then thoroughly stirred into the latex, and a water-acid solution added, when a black coagulum of approximately the same consistency as the usual coagulum was obtained. The coagulum was lightly passed through a sheeting machine so as to squeeze out a

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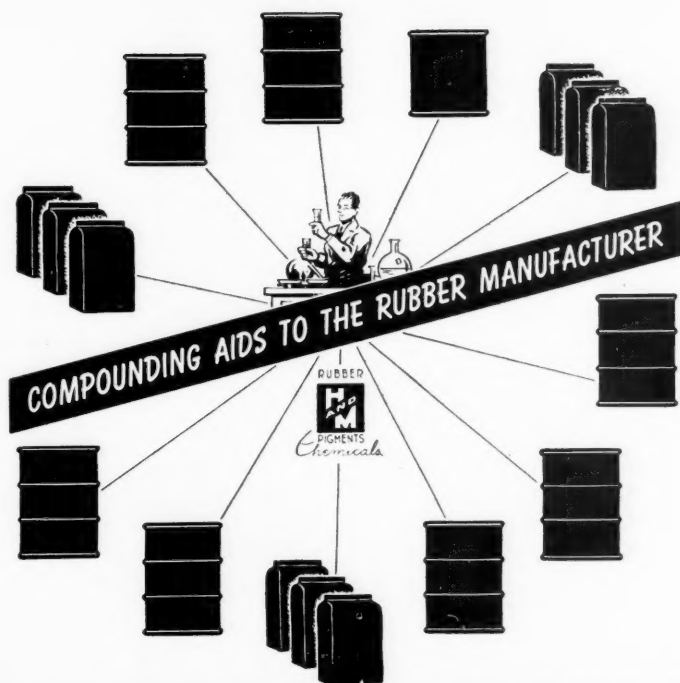
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maximum of the serum without eliminating the fillers. The sheets were allowed to drip for two days; then they could easily be creped, yielding a product having the appearance of an ordinary crepe black in color. The crepe was cut into strips of a size suitable for making tires, and strips were tightly pressed in wooden molds for 24 hours so as to give bands with dimensions slightly larger than required for the finished tires. Next the bands were placed on carefully cleaned rims, the edges of the rubber beveled, and the individual units enclosed in two-piece molds dusted with talcum on the inside, and vulcanized in an autoclave at three kilograms' pressure for 2 1/2 to three hours, depending on the size of the tires and the composition of the mix. Curing necessarily was prolonged since no accelerator or other chemical was available.

The tires thus obtained resembled those obtained by the usual factory means and adhered well to the rims. During the short period from the end of 1944 to the beginning of 1945, almost 600 tires of different sizes were made in this way. The same method was also employed to produce a number of spare parts for garages—as shock absorbers, rings, joints, reinforced or canvas-lined rubber parts, etc.

The compounding process described, though crude, could be greatly improved, M. Thomas believes and, as it does away with the need of heavy milling and mixing machinery, might be useful for certain manufactures. In any case the experiments have yielded a new type of rubber containing fillers and having special qualities which might appeal to consumers. Samples of the rubber have been submitted to Saigon manufacturers who have begun tests which apparently are yielding very promising results.

Of one rubber, containing 60% carbon black, it is said that its rate of cure, resistance to traction, and unusual plasticity properties put it in a class by itself. This rubber can be plasticized two to three times faster than ordinary rubber and with very low power consumption. Factory and laboratory tests are to be continued.

Incidentally, it is to be noted that while the above work was being carried out under fairly primitive conditions on a plantation in the Far East, parallel tests were being made independently in the United States with GR-S latex.

Report of Soc. Financiere

A report of the large Société Financière des Caoutchoucs issued toward the end of June, 1946, discusses the position of various rubber estates of the companies owned by the concern in the chief rubber centers of the Far East and in Africa.

The Plantation des Terres Rouges in Indo-China had at the end of 1945 a rubber acreage amounting to 17,967 hectares (hectare=2.47 acres), of which 9,307 consisted of budgrafts or trees from selected seed. It was not stated whether or to what extent tapping had been resumed here.

The Compagnie du Cambodge had 15,709 hectares of rubber at the end of 1945, with 3,787 hectares in budgrafts or seedling from selected seed. Here production of rubber was started again at the beginning of 1946 on the Chup Plantations, but on a very modest scale.

The Compagnie de Padang, with estates in Indo-China as well as in Sumatra, produced only 30,000 kilograms of rubber

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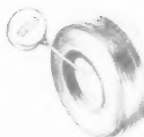
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Tests have proved that rayon cord tires give longer life in rough cross-country travel and long distance hauling. Being thinner and lighter, they generate less heat, reducing the danger of heat breakdowns.

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Because they are made of solid, more uniform filaments, rayon cords are stronger per unit of weight. Less rubber and less cord are required to obtain the same strength, and a lighter-weight tire results.



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There are fewer blowouts and road failures with rayon cord tires. Operators of bus and truck fleets have reported highly improved safety records as a result of rayon.

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in 1945 against 230,000 kilograms in 1944 and 302,000 kilograms in 1943.

The Compagnie de l'Hevea, formed in 1939, has in the province of Coquilhatville, Belgian Congo, concessions covering 12,000 hectares, of which 4,490 hectares were planted to *Hevea* at the end of 1945; the plantings include a large percentage of the finest budgrafts. Tapping did not start here until the end of 1944 and in 1945 the output was 90,000 kilograms.

Finally there is the Soc. Africaine Forestière et Agricole in the Cameroons, which has a concession of 17,000 hectares, of which 6,287 hectares are under rubber.

Tax on Crude Rubber Exports

Exports of all crude rubber from Indo-China to any destination whatever are now subject to a special tax ordered July 20, 1946, by the High Commissioner of France for Indo-China. The tax on standard-quality sheet and crepe is 0.46-piaster per kilogram, on lower quality sheet and crepe or concentrated latex, it is 0.27-piaster, and on liquid latex, 0.18-piaster per kilogram. Converted into United States currency the rates for the three categories are respectively about 2½¢ almost 2¢, and a little over 1¢ a pound.

MALAYA

Reports have it that a Chinese organization is advertising for plant and technicians for a tire factory presumably to be established in Singapore. It is not stated whether the organization is one that had operated here in prewar times and was now attempting to get reestablished, or whether it represents entirely new interests.

As noted previously, Ayer Kuning Rubber Co., Ltd., is to be acquired by the Highlands & Lowlands Para Rubber Co., Ltd. To finance the transaction the latter company has increased its registered capital of £350,000 by an additional £250,000 in £1 ordinary shares.

CHINA

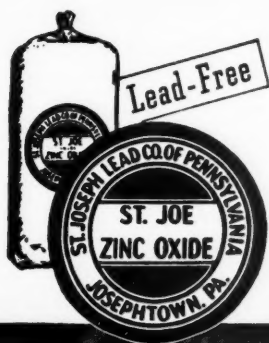
Of 40 rubber goods factories in Tientsin, China, 29 are owned by Chinese; while the remaining 11, formerly Japanese owned, have for the most part been taken over by the Ministry of Economic Affairs. These factories, when operating on a full-time basis, employed 3,100 persons, who produced 752,000 pairs of canvas shoes, 10,000 rubber boots, 16,150 dozen rubber soles, and 28,000 dozen rubber heels, per month, in addition to 38,400 pairs of bicycle tires, 139,000 pairs cycle tubes, 17,000 kilograms of hose, 8,400 inner tubes for motor vehicles, and 134,000 feet of rubber belting.

Early in 1946, however, only 20% of normal output was achieved by the Chinese factories and 30% by the Japanese, but stocks of raw material were said to have been exhausted by July.

LEBANON

War needs stimulated the development of the manufacture of rubber soles and heels in Lebanon; so sufficient amounts were produced not only to supply home demands, but to permit a limited export trade with neighboring countries. The raw material consisted of scrap rubber, chiefly old tires, and daily output was said to have reached 1,200 pairs of combination soles and heels and 400 pairs of heels. The ten largest producers are estimated to have produced 316,000 combination soles and heels and 95,000 heels in 1945. It was not possible to maintain this rate, and present production has dropped to less than half that of 1945; however local manufacturers appear confident that this war-born industry will be permanent.

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Editor's Book Table

BOOK REVIEWS

"Controlling World Trade—Cartels and Commodity Agreements." Edward S. Mason. Published for the Committee for Economic Development, 285 Madison Ave., New York 17, N. Y., by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Cloth, 5 $\frac{3}{4}$ by 9 inches, 302 pages. Price \$2.50.

This volume, the thirteenth in the series of research studies made for the Committee for Economic Development, examines two important tools used in prewar international trade: the cartel and the commodity agreement. The author, professor of economics at Harvard University, makes evident that the world can rid itself of the undesirable features of cartels and commodity agreements if there is a willingness to undertake cooperative action in particular areas of international trade. Noting immediate major problems that face most nations, the author suggests solutions that will accord with long-range goals of rational international trading. American attitudes and objects in foreign trade are reviewed, and included is a timely discussion of the State Department's "Proposals for Expansion of World Trade and Employment."

The book is divided into two sections. The first, on international business cartels, after a summary of recommendations, consists of four chapters covering international business agreements; statement of the problem; cartel policy by international agreement; American policy toward business agreements in foreign trade; and cartels and American security. The second section, on intergovernmental commodity agreements, also gives a summary of findings and recommendations, and contains four chapters, dealing with origins and aims of commodity agreements; postwar outlook for particular raw materials; international commodity consultation, buffer stocks, and quota schemes; and American raw material interests and commodity policy. A note on the Committee and its research program and excerpts from its by-laws also are included. A subject index is appended.

The subject of rubber trade is given major consideration throughout the book. The role played by cartels and commodity agreements in rubber world trade is reviewed, and discussions of the International Rubber Advisory Committee and its Advisory Panel and of the International Rubber Regulation Committee appear. The effect of the synthetic rubber program in shaping future world rubber trade is emphasized, and the factors affecting the future balance of natural versus synthetic rubber in international agreements are comprehensively discussed.

"Chemical Engineering Catalog, 1946-47." Thirty-First Annual Edition. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. Cloth, 11 by 8 inches, 1768 pages. Price: free to domestic members of industry; \$7.50 to foreign subscribers.

The current edition of this standard reference volume continues to give data on equipment, supplies, chemicals, and materials in the chemical industry, as provided by more than 600 companies. Representing an increase in size of 60 pages over the previous 1945-46 edition, the book contains enlarged sections on suppliers of equipment and chemicals. As in previous editions, a valuable index of trade names is also included. The section on technical and scientific books has again been curtailed and lists only those books in print by the publisher and by the publishers cooperating in this section of the Catalog.

"Going Abroad for Business." Edmund B. Besselièvre. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. Cloth, 6 by 9 inches, 248 pages. Price \$4.

This book will be an invaluable guide for anyone desiring to conduct business in a foreign country, or to prepare himself for residence abroad for business reasons. In a highly readable and entertaining manner, the author describes the subtleties of alien psychology, the pitfalls of local prejudice and protocol, and the real pleasure to be derived from commercial and social contacts in foreign lands.

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official, when and when not to invite him to dinner, what sort of domestic arrangements to maintain, the social activities of your wife, and a host of similar matters are discussed at length. In addition much valuable information is given on the technique of business transactions and liaison with the home office. So detailed are the descriptions as to include foreign dishes, tipping, the servant problem, desirable residential localities in various cities, and similar necessary, yet seemingly unimportant matters.

The various chapters cover such points as necessary preparations for foreign service, languages, arrangement with the employers, how to operate a branch office or as an agent, selection of a representative, salesmanship, advertising and publicity; status as a foreigner, living conditions, home leave, the metric system, monetary units of various countries with notes on coins and bills current, patents and patent and trade mark protection, proper use of the mail services, telegrams and cables, private telegraphic codes, and lists of government and private literature on foreign business and countries. Of further value is a comprehensive and detailed index.

NEW PUBLICATIONS

"Kriston Thermosetting Resin." Technical Bulletin PM5. B. F. Goodrich Chemical Co., Cleveland 15, O. 12 pages. This illustrated technical bulletin covers properties and processing information for Kriston, a new series of allyl ester casting resin. Individual sections are devoted to Kriston A, properties of the monomer, preparation of the monomer, curing, use of Kriston, properties of cured Kriston, and applications.

"Rapid Photometric Methods for Determining Rubber and Resins in Guayule Tissue and Rubber in Crude Rubber Products." Hamilton P. Traub, United States Department of Agriculture, Washington, D. C. Technical Bulletin No. 920, August, 1946. 37 pages. This technical report describes rapid semi-microphotometric methods for determining rubber and resin in small samples of guayule tissue. These methods may also be adapted for other rubber or resin bearing plants, for determining rubber in crude rubber products, and for the analysis of synthetic rubbers. Procedures and experimental results are given, together with a summary and a list of literature cited.

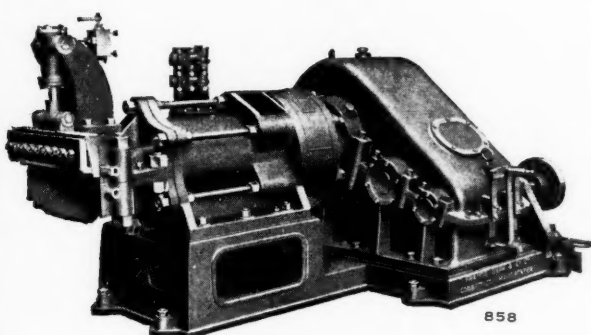
"Emulsions." Seventh Edition. Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y. 72 pages. In addition to descriptions of the company's wetting and other agents for emulsion use, this new edition presents more than 113 practical formulae and methods for preparing cosmetic and industrial emulsions of oils, waxes, fats, and greases. The use of many of the newly developed amine soaps and cationic dispersants as emulsifying agents is also described.

"Kinetic Studies in the Chemistry of Rubber and Related Materials. I. The Thermal Oxidation of Ethyl Linoleate." J. L. Bolland. Publication No. 70. The British Rubber Producers Research Association, 48 Tewin Rd., Welwyn Garden City, Herts, England. 20 pages. The kinetics of the initial stages of the thermal oxidation of ethyl linoleate by molecular oxygen have been investigated in the temperature range 35-75° C. The reaction mechanism is established; the chain propagation reactions are identified, and the method of chain termination is shown.

Publications of the Standard Chemical Co., 147 Park St., Akron, O. "Plasticizer ODN." 5 pages. This bulletin describes a new plasticizer for use in nitrile rubber and vinyl resins. Physical and chemical properties of the material are given together with laboratory test results of vulcanizates showing effectiveness of the plasticizer in producing soft, resilient stocks having good low-temperature flexibility. "Comparison Pine Tar, Resinex L-4 in Natural Rubber." 1 page. Test results are given herein, both before and after aging, showing the comparative effects of pine tar and Resinex L-4 as softeners for a standard natural stock.



RUBBER EXTRUDERS



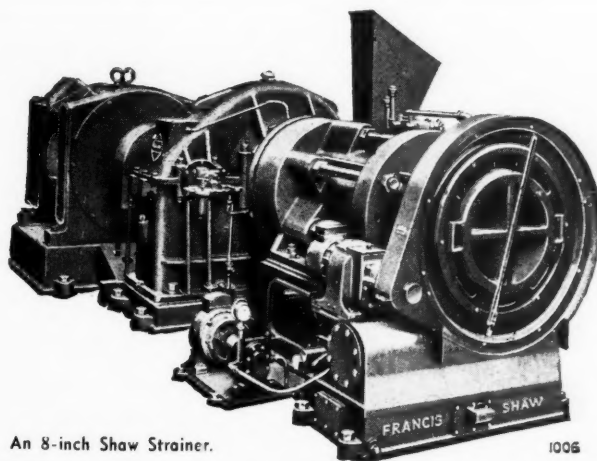
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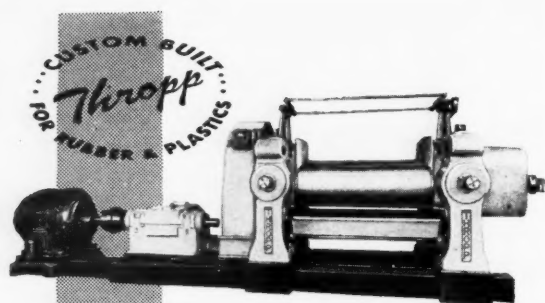
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"Summary of Technical and Patent Assets, 1946 Edition." Phillips Petroleum Co., Bartlesville, Okla. 206 pages. This book presents a classified summary of the patent and technical assets of the company. Of special interest are the sections on synthetic rubber, covering seven patents, and on carbon black, covering 16 patents.

"DC 2103 Resin." Data Sheet No. C 20-2. Dow Corning Corp., Midland, Mich. September 30, 1946. 9 pages. This bulletin describes a new thermosetting silicone resin especially designed for use as a heat-stable bonding material for inorganic fabrics in the preparation of rigid electric laminates, and for bonding finely divided particles such as powdered metals or mica, silica, or carbon. Tables on physical, chemical, and electrical properties of the resin are given as well as information on methods of use.

"Aminox in Natural Rubber Heavy-Duty Inner Tubes." Compounding Research Report No. 2. Naugatuck Chemical Division of United States Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y. 8 pages. After a review of the composition, physical and compounding properties of Aminox, recipes and test data appear on its use in natural heavy-duty inner tubes as an antioxidant and reversion inhibitor.

"Proving Ground." Esso Marketers, 30 Rockefeller Plaza, New York 20, N. Y. 48 pages. This illustrated booklet contains descriptions of 32 tests of petroleum products and their significance. Also included are a glossary of petroleum terms and an introduction describing the growth and development of the Esso Laboratories.

"Barrett Rubber Compounding Materials." Rubber Laboratory Release No. 5. Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. November 4, 1946. 18 pages. This bulletin gives formulation and laboratory test results showing effect on an EPC black-GR-S stock of varying quantities of Cumar MS, RH, and MH-2½ resins and Bardex and B.R.H. No. 2 softeners. Properties tested include tension, tear resistance, abrasion resistance, compression set, resilience, and hysteresis.

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(Continued on page 446)



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Market Reviews

COTTON & FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES						
	Sept. 28	Oct. 26	Nov. 2	Nov. 9	Nov. 16	Nov. 23
futures						
Dec.	37.88	33.15	31.90	30.48	31.70	30.70
Feb.	37.67	32.98	31.70	30.09	31.25	30.40
May	37.06	32.32	31.45	29.55	30.21	29.75
July	36.04	31.00	30.32	28.35	29.00	28.48
Sept.	34.08	29.17	28.49	26.45	26.50	26.66
Nov.	32.92	27.87	27.37	25.32	25.25	25.46

THE critical period existing in the cotton market since October 15 appeared to have ended with the close of the month. Although November brought some nervous fluctuation, market undertones were steady. Some differences in opinion were expressed as to the factors stabilizing the market, but the removal of the 120-day limitation on forward sales of cotton textiles was generally given as the prime factor.

The 15/16-inch middling spot price was 32.84c on November 1, the high for the month. Thereafter the price fluctuated between 30 and 32.5c during the month, with one break on November 7 to 28.70c occasioned by the deflationary implications of the elections. The market closed at 31.77c on November 30.

The February futures market fluctuations corresponded rather closely with those of the spot market. From the monthly high of 31.82c on November 1, prices fluctuated between 29.5 and 31.5c, with a break on November 7 to 27.70c. The closing price on November 30 was 30.73c.

Decontrol did not bring any inflationary trends, but seemed instead to exert a stabilizing effect on the market. Another steadying factor was the belief that cotton policy would not be changed in 1947, as the Republicans are not expected to drop the cotton export subsidy or other programs.

The report of a special committee of the New York Cotton Exchange calling for increased margins and a supervisory agency was approved by the Exchange's board of managers. Although lauded by government officials, the new plan brought a wave of protest from Exchange members and throughout the South. A meeting of Exchange members was called for November 26 to discuss the proposals; while the New Orleans exchange will meet December 2 for the same purpose. The government also scheduled a meeting for December 10 to discuss revised trade practices.

It was pointed out that decontrol had brought the prices of cotton and rayon into closer alignment, and reduction in the price differential was expected to increase demand for the natural fiber. This competitive position was further emphasized by increases in the price of rayon yarn by as much as 20%, while raw cotton prices remained relatively stable.

The strong statistical position of the cotton market was further emphasized by reports estimating the total crop as of November 1 at 8,679,000 bales, the smallest since 1921. Reasons advanced for this small crop were heavy weevil infestation and early picking.

To help the trade judge the effect of speculative activity on the market, the Department of Agriculture announced

that it will issue regular monthly reports on the market positions, by classes, of large traders in cotton futures. The first report, issued November 18, stated the October break to be due to increased speculative holdings, and short hedging commitments of large traders. The Department also tentatively estimated the 1946-47 world cotton crop at 22,050,000 bales, the lowest production since 1923-24, with the exception of last year's estimate of 20,440,000 bales.

Fabrics

After two weeks of decontrol, pricing developments in the cotton fabrics market continued in a state of flux. No real market prices were established, but two sharply defined conditions existed: first, the bulk of the market is sold ahead at old OPA ceilings with some commitments running as far ahead as June; second, many instances of sales for quick delivery, usually of second hands, took place at prices reaching at least 25% higher than former maximum prices. Adding to the situation were the few isolated cases of selling houses accepting orders for delivery of new goods into April, May, and June at prices averaging 10% above old ceilings.

Wide variations were reported in the selling prices of different fabrics. Sales of certain print cloths ran as high as 30c per yard; while, in contrast, some types of heavy ducks moved at 10% below old ceilings. The laws of supply and demand, beginning to take effect, applied to the majority of yarns and fabrics available for quick delivery. Market conditions prior to decontrol early in the month were rather dull, and little actual upswing in activity was noticed upon lifting of the ceilings.

Prices of finished goods showed general increases, with mechanicals such as hose and belting at 67.16c a pound, and 40-inch rubber hollands up to 30.5-37.25c per yard. The raincoat industry reports considerable slowing up in the trade with the nearing of the season's end, although men's raincoats are reported to be still moving satisfactorily.

The wide gray cloth market was very active during the closing weeks of November. Demand was high for wide sheerings, drills, twills, print cloths, and certain others. A tremendous demand for enamelled duck was reported, and, in view of dim prospects for early increase in yardage, twills and drills were being substituted for the enamelled ducks in such uses as backing material.

Chief result from decontrol will be improved availability of desired fabrics such as four-ply chafers which are in particularly short supply. The output of single chafers will be swung over to the plied constructions to alleviate pressing needs in the rubber manufacturing industry. Also particularly sought, and on any long-term basis available, by the rubber industry were hose and belting ducks and chafers, without much prospect of early relief.

Some statistics are available on the production of tire cord, fabric, and casings for the first two quarters of 1946. Production of cotton tire cord and fabric totaled 72 million pounds for the first quarter, and 78 million for the second

quarter. Total tire casings produced numbered 18,500,000 for the first quarter, and 20,000,000 for the second.

RAYON

REVISED rayon gray prices at the end of November ranged from 10 to 15% above former ceilings, with some isolated instances of price increases as high as 20%. The increases, however, were considerably more conservative than had been anticipated in the trade. It was pointed out that the new quotations eliminate previous inequities and allow the mills to earn a fair profit on all lines, making it possible for them to reintroduce many items missing from the market during the past three years. These new lines will probably be available about April, 1947.

In view of the lower cotton prices, inflationary increases in rayon quotations are not expected because of competitive factors both for textile and industrial uses.

Total domestic rayon production in the third quarter of 1946 was 213,500,000 pounds, 10% over the corresponding period in 1945, giving a nine-month total of 638,500,000 so far this year. Third-quarter production of rayon filament yarn by all processes was 167,300,000 pounds, of which 55,200,000 pounds were of viscose tire-type yarns. Deliveries of rayon filament yarn to domestic consumers during the third quarter amounted to 163,500,000 pounds.

Total rayon shipments during October were 72,200,000 pounds, 6% above those of September. Filament yarn shipments during October totaled 57,400,000 pounds.

Production of rayon tire cord and fabric totaled 51,000,000 pounds for the first quarter of 1946, and 53,000,000 pounds for the second quarter.

In general rayon fabricated products are believed to be in a very favorable position both as regards price and production levels, but undoubtedly would be affected adversely by weakness in cotton goods. Of all types, rayon yarn and staple are in the most favorable price-production situation of all.

SCRAP RUBBER

PRICES on natural scrap rubber, both in tires and tire parts, are reported to have shown an advance after decontrol. While prices were ostensibly nominal, with trading at a bare minimum, it was indicated that some prices were already about \$1 higher for tires and peelings. Similar price increases, however, have not been effected for synthetic or recap rubber scrap. Dealers were waiting to discuss the price situation with reclaimers before committing themselves on prices. It was thought likely that separate prices might be established for natural and synthetic scrap tires.

There were some reports that reclaimers were easing somewhat their restrictions on shipments of mixed natural and synthetic tires, but in the main these specifications were still being held. Movement of tire parts, especially peelings, is

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reported to be slower as a result of increased production of new tires. Tires were moving fairly steadily. In general, scrap movement picked up in the early part of November, but slowed down somewhat after decontrol.

In view of the confused situation existing in the domestic market, dealers were said to be concentrating on export shipments, facilitated by the settlement of the maritime strike. A terrific demand for scrap tires from the Orient is acknowledged, for use in making sandals and shoe soles in Hong Kong and other parts of China. Inquiries have been coming in week after week, and exports of tire scrap are assuming large proportions.

The following are dealers' buying prices for scrap rubber, in carload lots, delivered points indicated:

	Eastern Points	Akron, O. (Net Tons)
Mixed auto tires.....	\$17.50	\$19.50
Truck and bus tires.....	16.50	19.00
Beadless tires.....	23.00	24.50
S.A.G. passenger (natural).....	17.50	18.00
S.A.G. passenger (synthetic).....	nom.	nom.
S.A.G. truck (natural).....	15.50	16.00
S.A.G. truck (synthetic).....	nom.	nom.
No. 1 peelings (natural).....	45.00	46.00
No. 1 peelings (synthetic).....	nom.	nom.
No. 1 peelings (recap.).....	nom.	nom.
No. 2 peelings (natural).....	31.00	31.50
No. 2 peelings (synthetic).....	nom.	nom.
No. 2 peelings (recap.).....	nom.	nom.
No. 3 peelings (natural).....	28.00	29.00
No. 3 peelings (synthetic).....	nom.	nom.
	(\$ per Lb.)	
Mixed auto tubes.....	5.75	6.0
Red passenger tubes.....	7.375	7.375
Black passenger tubes.....	6.25	6.25
Black truck tubes.....	6.0	6.125
Mixed puncture-proof tubes.....	2.0	2.0
Air brake hose.....	nom.	nom.
Rubber boots and shoes.....	nom.	nom.

RECLAIMED RUBBER

THE effect of price decontrol is reported to be very slight on the reclaimed rubber industry, with price levels remaining at former ceilings. Reclaimers are enjoying a buyers' market for scrap rubber because of good stocks on hand estimated at 15 months' supply. The post-decontrol price increases for natural scrap are therefore stated to be primarily asking prices and do not reflect the actual market. The advantageous position of reclaimers is further shown by the slowdown in scrap shipments after the advent of higher asking prices.

At the same time, the sellers' market in finished reclaims remains in effect. Production is at a high level, close to capacity, and continues to lag behind demand. Demand, already at high levels, has shown no further increase as purchasers have adjusted their formulations to the available reclaim. There is no doubt that could reclaim production be still further increased, the demand would follow accordingly as formulations were readjusted. Some increase in price of custom types of reclaim has been noticed, but has had no effect on the general market.

Final August and preliminary September figures on reclaim are now available. In August, production of reclaim was 25,798 long tons, consumption 24,566 long tons, exports totaled 1,093 long tons, and end-of-month stocks were 35,742 long tons. Preliminary figures for September, in long tons, are: production 23,981; con-

sumption, 23,732; exports, 579; and end-of-month stocks, 35,412.

Reclaimed Rubber Prices

Auto Tire	Sp. Grav.	¢ per Lb.
Black Select.....	1.16-1.18	7½ / 7¾
Acid.....	1.18-1.22	8½ / 8¾
Shoe		
Standard.....	1.56-1.60	8 / 8¼
Tubes		
Black.....	1.19-1.28	12¼ / 12½
Gray.....	1.15-1.26	13 / 14
Red.....	1.15-1.32	13 / 13½
Miscellaneous		
Mechanical blends...	1.25-1.50	5½ / 6½

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

FINANCIAL

Baldwin Locomotive Works, Philadelphia, Pa., and subsidiaries. Year ended September 30; consolidated net profit, \$4,672,046, against \$3,440,296 for the year ended September 30, 1945; consolidated sales, \$9,796,992, against \$178,701,048.

Phillips Petroleum Co., Bartlesville, Okla., and subsidiaries. Third quarter: net profit, \$6,760,974, equal to \$1.37 a share, contrasted with \$4,317,551, or 88¢ a share, in the 1945 quarter; provision for federal income taxes, \$2,696,100, against \$1,136,200.

Pittsburgh Plate Glass Co., Pittsburgh, Pa. First nine months, 1946: net income, \$13,168,435, equal to \$1.48 a share for outstanding stock, compared with \$9,961,357, or \$1.13 a share, in the corresponding period of 1945, net sales, \$132,839,949, against \$113,929,034.

Dow Chemical Co., Midland, Mich., and subsidiaries. August quarter: net profit, \$3,607,303, equal to \$2.64 a common share, against \$2,273,966, or \$1.57 a share, in the 1945 period.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Nine months ended September 30, 1946: net income \$82,179,876, equal to \$6.88 a common share, compared with \$53,975,625, or \$4.34 a share, for the corresponding period a year ago; net sales, \$472,255,650, against \$472,987,500; provision for depreciation and obsolescence, \$19,947,259, against \$26,253,732; provision for taxes, \$45,030,000, against \$84,510,000.

Fixed Government Prices*

	Price per Pound	
	Civilian Use	Other Than Civilian Use
Guayule		
Guayule (carload lots).....	\$0.17½	\$0.31
Latex		
Normal (tank car lots).....	.26	.43½
Creamed (tank car lots).....	.26¾	.44¼
Centrifuged (tank car lots).....	.27¾	.45¼
Heat-Concentrated (carload drums).....	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets.....	.22½	.40
1X Thin Pale Latex Crepe.....	.22½	.40
2 Thick Pale Latex Crepe.....	.22	.39½
1X Brown Crepe.....	.21¾	.38¾
2X Brown Crepe.....	.21½	.38½
2 Remilled Blankets (Amber).....	.21¼	.38¼
3 Remilled Blankets (Amber).....	.21¼	.38½
Rolled Brown.....	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN).....	.27½	.45
GR-S (Stuna S).....	.18½	.36
GR-I (Butyl).....	.18½	.33
Wild Rubber		
Upriver Coarse (crude).....	.12¾	.26½
(washed and dried).....	.20¼	.37¾
Islands Fine (crude).....	.14¾	.28¼
(washed and dried).....	.22½	.40
Caucho Ball (crude).....	.11½	.24¼
(washed and dried).....	.19½	.37
Mangabiera (crude).....	.08½	.19¼
(washed and dried).....	.18	.35½

* For a complete list of all grades of all rubbers see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

Dividends Declared

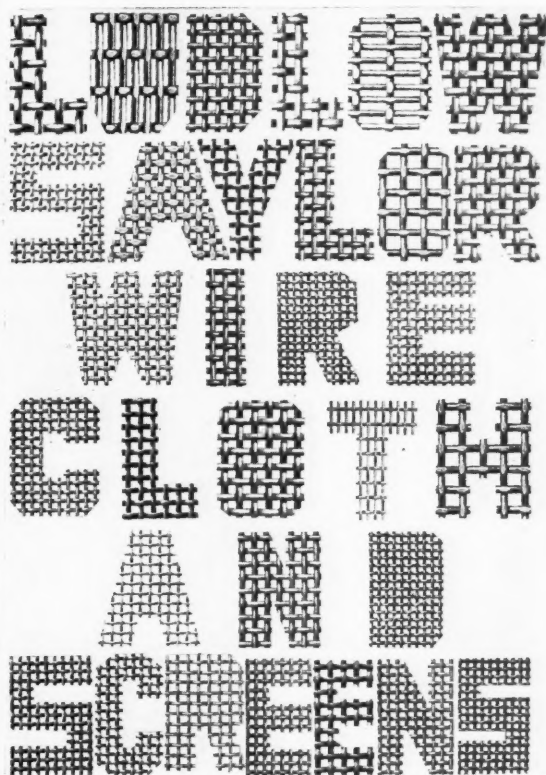
COMPANY	STOCK	RATE	PAYABLE	STOCK OF RECORD
Belden Mfg. Co.....	Com.	\$0.30	Dec. 2	Nov. 18
Boston Woven Hose & Rubber Co.....	Com.	0.50 q.	Nov. 25	Nov. 15
Boston Woven Hose & Rubber Co.....	Com.	1.75 spec.	Jan. 2	Nov. 15
Brunswick-Balke-Collender Co.....	Com.	1.00 yr.-end	Dec. 16	Dec. 2
Brunswick-Balke-Collender Co.....	Pfd.	1.25 q.	Jan. 2	Dec. 20
Canadian Wire & Cable Co., Ltd.....	Com.	1.00 q.	Dec. 15	Nov. 11
Canadian Tire, Ltd.....	Com.	0.25 q.	Dec. 1	Nov. 20
Collier Insulated Wire Co.....	Com.	0.25	Nov. 1	Oct. 24
Crown Cork & Seal Co.....	Com.	0.75	Dec. 20	Nov. 26
E. I. du Pont de Nemours & Co., Inc.....	Com.	2.25 yr.-end	Dec. 14	Nov. 25
E. I. du Pont de Nemours & Co., Inc.....	Pfd.	1.12½ q.	Jan. 25	Jan. 10
Flintkote Co.....	Pfd.	1.00 q.	Dec. 16	Dec. 10
General Motors Corp.....	Com.	0.50	Dec. 10	Nov. 14
General Motors Corp.....	\$5 Pfd.	1.25	Feb. 1	Jan. 6
General Tire & Rubber Co.....	\$5 Com.	0.25	Nov. 30	Nov. 20
B. F. Goodrich Co.....	Com.	1.00	Dec. 31	Dec. 12
B. F. Goodrich Co.....	Com.	1.00 spec	Dec. 31	Dec. 12
B. F. Goodrich Co.....	Pfd.	1.25	Dec. 31	Dec. 12
Johnson & Johnson.....	Com.	0.10	Dec. 12	Nov. 29
Lee Rubber & Tire Corp.....	Com.	1.00	Dec. 16	Dec. 2
Midwest Rubber Reclaiming Co.....	Com.	0.25 q.	Dec. 30	Dec. 19
Mohawk Rubber Co.....	Com.	0.50 extra	Dec. 20	Nov. 30
Thermoid Co.....	Com.	0.15 q.	Dec. 16	Dec. 5
United Elastic Corp.....	Com.	0.75 q.	Dec. 10	Nov. 23
United States Rubber Co.....	Com.	0.50 extra	Dec. 10	Nov. 23
United States Rubber Co.....	Com.	0.75 q.	Dec. 9	Nov. 18
United States Rubber Co.....	Com.	1.00 extra	Jan. 6	Nov. 18
United States Rubber Co.....	Pfd.	2.00 q.	Dec. 8	Nov. 18

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Super-Loy	Arch-Crimp	Bending	Circles
Steel	Coiled	Binding	Cones
Galvanized	Double-Crimp	Brazing	Crates
Tinned	Double-Fill	Calendering	Cylinders
Stainless Steel	Dutch	Clinching	Discs
Nickel-Chro-	Filter	Cutting	Forms
mium Alloys	Flat-Top	Dipping	Leaves
Aluminum	Herringbone-	Dishing	Leaves
Brass	Twill	Flanging	Panels
Bronze	Intermediate-	Flattening	Pieces
Commercial	Crimp	Forming	Racks
Phosphor	Rek-Tang	Framing	Ribbons
Copper	Selva-Edge	Galvanizing	Rolls
Monel Metal	Straight-Warp	Painting	Sections
Nickel	Stranded	Shearing	Segments
Any special al-	Sta-Tru	Slitting	Spacers
loys available	Triple-Warp	Trimming	Strips
in rod or wire	Twilled	Arc-Welding	Template shapes
form	Twisted-Fill	Gas-Welding	Trays
	Twisted-Warp	Spot-Welding	

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Abrasives

Pumicestone, powdered .lb.	\$0.038	\$0.05
Rottenstone, domestic .ton	25.50	37.50

Accelerators, Inorganic

Lime, hydrated .ton	8.50	12.00
Litharge, commercial .lb.	.13	.15
Eagle, sublimed .lb.	.1375	.1425
FBS .lb.	.1375	.1425
Red Lead, commercial .lb.	14.25	.165
#2 RM .lb.	.1475	.1525
Eagle .lb.	.1475	.1525
White lead, basic .lb.	.13	.135
Eagle .lb.	.1325	.135
Silicate .lb.	.1375	.1425
Eagle .lb.	.1375	.1425
Zinc oxide, commercial .lb.	.09	.13

Accelerators, Organic

A-10 .lb.	.36	.42
A-19 .lb.	.52	.58
A-32 .lb.	.59	.69
A-77 .lb.	.42	.55
A-100 .lb.	.42	.55
Accelerator 8 .lb.	.63	.65
49 .lb.	.40	.42
552 .lb.	1.63	
808 .lb.	.59	.61
833 .lb.	1.13	1.15
Acrin .lb.	.65	
Advan .lb.	.55	
Altax .lb.	.39	.41
Antox .lb.	.54	.56
Arazate .lb.	1.53	
Beutene .lb.	.59	.64
B-J-F .lb.	.34	.39
Butasan .lb.	1.10	
Butazate .lb.	1.63	
Butyl Eight .lb.	.97	.99
Zimate .lb.	1.10	
Captax .lb.	.34	.4275
C-P-B .lb.	1.95	
Cumate .lb.	1.60	
Cuprax .lb.	.60	.62
Diesterex N .lb.	.50	.57
DOTG (diorthotolylguanidine) .lb.	.44	.47
DPG (diphenylguanidine) .lb.	.35	.41
El-Sixty .lb.	.36	.43
Ethasan .lb.	1.10	
Ethazate .lb.	1.10	
Ethyl Selenac .lb.	1.60	
Tuads .lb.	1.25	
Tuex .lb.	1.25	
Zimate .lb.	1.10	
Ethylidene Aniline .lb.	.42	.43
Formaniline .lb.	.36	.37
Good-Rite Erie .lb.	.60	.62
Heptene .lb.	.34	.39
Base .lb.	1.25	1.40
M-B-T .lb.	.34	.39
M-B-T-S .lb.	.39	.44
Methasan .lb.	1.20	
Methazate .lb.	1.20	
Methyl Selenac .lb.	1.60	
Tuads .lb.	1.25	
Zimate .lb.	1.20	
Monex .lb.	1.25	
Mono-Thiurad .lb.	1.25	
Morfex 33 .lb.	.60	.65
O-X-A-F .lb.	.38	.43
Pentex .lb.	.74	.84
Flour .lb.	1.225	1.325
Permalux .lb.	1.18	1.20
Phenex .lb.	1.53	.54
Pipazate .lb.	1.25	
Polyac .lb.	.44	.46
Safex .lb.	1.15	1.25
Santocure .lb.	.60	.67
Selazate .lb.	1.60	
SPDX-G .lb.	.53	.58
Tellurac .lb.	1.60	
Tetrone .lb.	1.25	
A .lb.	1.85	
Thiocarbamide .lb.	.28	.33
Thiofide .lb.	.39	.46
Thionex .lb.	1.25	
Thiotax .lb.	.34	.41
Thiurad .lb.	1.25	
Thiuram E .lb.	1.25	
M .lb.	1.25	
Trimene .lb.	.54	.64
Base .lb.	1.03	1.18
Triphenylguanidine (TPG) .lb.	.45	
Tuex .lb.	1.25	
2-MT .lb.	.53	.60
Uto .lb.	.99	1.04
L .lb.	1.04	

Ureka .lb.	\$0.50	\$0.57
Blend B .lb.	.50	.57
C .lb.	.48	.55
Vulcanex .lb.	.42	.43
Z-B-X .lb.	2.45	
Zenite .lb.	.37	.39
A .lb.	.42	.44
B .lb.	.39	.41

Activators

Activex .lb.	.20	.22
Aero AC 50 .lb.	.36	.52
Barak .lb.	.36	
Bunac K-17 .lb.	.17	.19
D-B-A .lb.	1.95	
Delac P .lb.	.39	.48
Double distilled cottonseed fatty acids .lb.	.1175	.14
Guantal .lb.	.39	.48
Laurex .lb.	.33	.36
Lead oleate .lb.	.1775	
MODX .lb.	.295	.345
Neo-Fat H.F.O. .lb.	.1475	.1675
1-60 .lb.	.1475	.1575
1-65 .lb.	.165	.18
13 .lb.	.225	.23
Palmitene .lb.	.15	
Plastone .lb.	.27	.30
Ridactol .lb.	.20	
Stearax Beads .lb.	.1475	.1575
Double pressed .lb.	.1575	.1675
Single pressed .lb.	.1575	.1675
Stearic acid, s.p. .lb.	.1575	.1575
Stearite .lb.	.1475	
Tonox .lb.	.50	.59
Zinc stearate .lb.	.48	.50

Alkalies

Caustic soda, flake .100 lbs.	2.90	3.35
Liquid, approx. 50% .100 lbs.	2.00	2.10
Solid .100 lbs.	2.50	4.95

Antioxidants

AgeRite Alba .lb.	1.95	2.05
Gel .lb.	.52	.54
Hipar .lb.	.61	.63
H.P. .lb.	.53	.55
Powder .lb.	.40	.42
Resin .lb.	.43	.45
D .lb.	.40	.42
Stalite .lb.	.40	.42
White .lb.	1.23	1.33
Akroflex C .lb.	.53	.55
Albasan .lb.	.69	.74
Aminox .lb.	.40	.49
Antox .lb.	.54	.56
Aranox .lb.	1.95	
Betanox .lb.	.43	.52
B-L-E .lb.	.40	.49
Powder .lb.	.61	.70
B-X-A .lb.	.63	.52
Copper Inhibitor X-872-A .lb.	1.15	
Flectol H .lb.	.40	.47
Flexamine .lb.	.53	.62
Heliocene .lb.	.23	.24
Mekon micro-crystalline wax, amber .lb.	.14	.16
Black .lb.	1.35	1.55
Yellow .lb.	1.55	1.75
Neozone (standard) .lb.	.61	.63
A .lb.	.40	.42
C .lb.	.43	.45
D .lb.	.40	.42
Distilled .lb.	.45	.47
Parazone .lb.	.68	.60
Parflectol .lb.	.53	.60
Permalux .lb.	1.18	1.20
Rio Resin .lb.	.36	.38
Santoflex B .lb.	.40	.47
BX .lb.	.54	.61
Santovar O .lb.	1.15	1.40
Santowhite .lb.	1.23	1.38
S.C.R. .lb.	.32	.34
Solux .lb.	1.28	1.30
Stabilite .lb.	.48	.50
Alba .lb.	.69	.74
L .lb.	.48	.50
Supproof .lb.	.2275	.2775
Jr. .lb.	1.625	2.125
Thermoflex .lb.	1.18	1.20
A .lb.	.61	.63
C .lb.	.54	.56
Tonox .lb.	.50	.59
Tysonite .lb.	1.65	1.725
V-G-B .lb.	.43	.52
Zenite .lb.	.37	.39

Antiseptics

Copper naphthenate, 6-8% .lb.	.19	
G-4 .lb.	.95	1.40
G-11 .lb.	4.50	4.75
Pentachlorophenol .lb.	.20	.25
Resorcinol, technical .lb.	.64	.74
Zinc naphthenate, 6-10% .lb.	1.775	.215

Blowing Agents

Ammonium bicarbonate .lb.	\$0.0564	
Carbonate .lb.	.0825	\$0.185
Sodium bicarbonate .100 lbs.	2.25	2.55
Carbonate, technical .100 lbs.	1.08	1.60
Sponge Paste .lb.	.20	
Unicel .lb.	.50	

Brake Lining Saturants

B.R.T. No. 3 .lb.	.0175	.0185
Resinex L-5 .lb.	.015	.0225

Carbon Blacks

Conductive Channel—CC

Continental R-20 .lb.	.055	.102
R-40 .lb.	.055	.102
Spheron C .lb.	.08	.125
I .lb.	.066	.111
N .lb.	.185	.25
Voltex .lb.	.15	.185

Easy Processing Channel—EPC

Continental AA .lb.	.055	.102
Kosmobile 77/Dixiedens .lb.	.055	.102
Micronex W-6 .lb.	.055	.097
Spheron #9 .lb.	.055	.102
Witco #12 .lb.	.055	.102
Wyex .lb.	.055	.117

Hard Processing Channel—HPC

Continental F .lb.	.055	.102
HX .lb.	.055	.117
Kosmobile S/Dixiedens .lb.	.055	.102
S .lb.	.055	.102
Micronex Mark II .lb.	.055	.097
Spheron #4 .lb.	.055	.102
Witco #6 .lb.	.055	.102

Medium Processing Channel—MPC

Arrow TX .lb.	.055	.117
Continental A .lb.	.055	.102
Kosmobile S-66/Dixie .lb.	.055	.102
densified S-66 .lb.	.055	.097
Micronex Standard .lb.	.055	.102
Spheron #6 .lb.	.055	.102
Witco #1 .lb.	.055	.102

Conductive Furnace—CF

Statex A .lb.	.08	.10
Sterling I .lb.	.09	

Fine Furnace—FF

Statex B .lb.	.0525	.09
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High Elongation Furnace—HEF

Sterling K .lb.	.05	.075
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High Modulus Furnace—HMF

Continex HMF .lb.	.16	
Kosmos 40/Dixie 40 .lb.	.05	.075
Modulux .lb.	.05	.075
Philblack A .lb.	.05	.06
Statex 93 .lb.	.05	.075
Sterling L .lb.	.05	.075

Semi-Reinforcing Furnace—SRF

Continex SRF .lb.	.035	.055
Essex .lb.	.035	.055
Furnex .lb.	.035	.06
Gastex .lb.	.035	.06
Kosmos 20/Dixie 20 .lb.	.035	.055
Pelletex .lb.	.035	.06
Sterling R, S .lb.	.036	.06

Fine Thermal—FT

P-33 .lb.	.045	
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Medium Thermal—MT

Thermax .lb.	.0225	
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Colors

Black

Lampblack, commercial .lb.	.085	.385
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Blue

Du Pont .lb.	.90	3.95
Toners .lb.	.30	3.50

Brown

Mapico .lb.	.1135	
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Green

Chrome .lb.	.10	.4175
Oxide .lb.	.275	.30
Du Pont .lb.	1.10	2.85
Guignet's .lb.	.70	
Toners .lb.	.35	4.00

Orange

Du Pont .lb.	2.35	3.05
Toners .lb.	.30	1.50

Red

Antimony crimson, 15-17% .lb.	.48	
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*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed and those readers interested should contact suppliers for spot prices.

†For trade names, see Color—White, Zinc Oxide.

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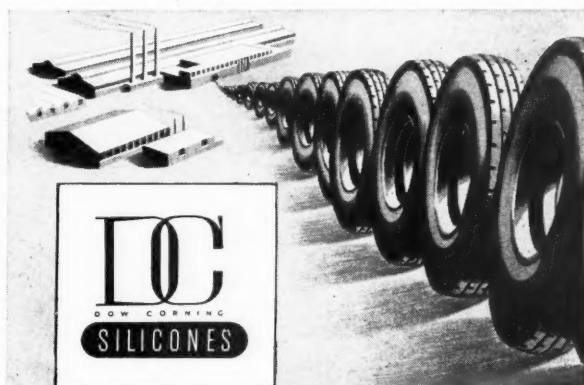
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- ★ **It improves surface quality and reduces scrap**
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- ★ **It is inexpensive and easy to apply**

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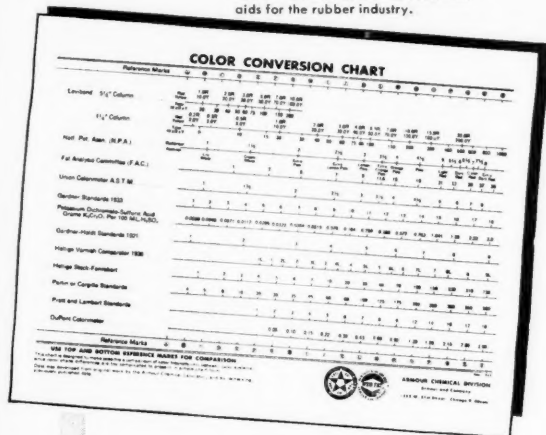
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New York Office: Empire State Building
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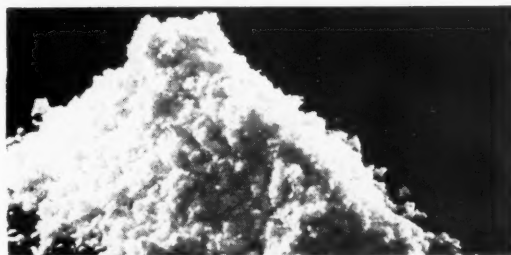
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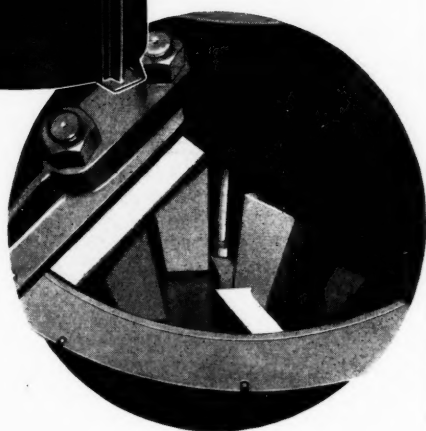
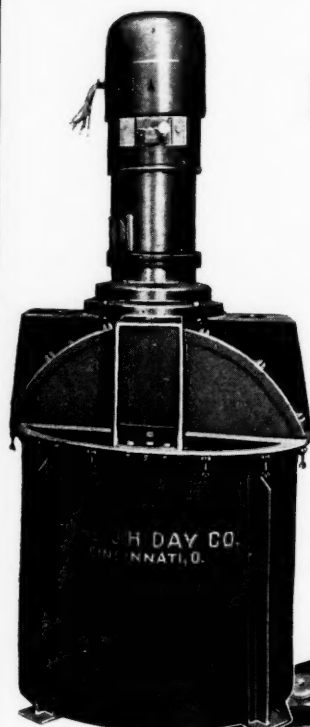
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DAY Rubber Cement Mixer

Hero Type

USED EXTENSIVELY
IN RUBBER PLANTS
THROUGHOUT THE
COUNTRY

BELOW
INTERIOR VIEW
SHOWING HEAVY
AGITATOR BLADES



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The lower picture shows the blade section of the DAY Rubber Cement Mixer, illustrating the close clearance between the stationary and the moving blades, which shear the rubber into smaller and smaller pieces, constantly exposing more surface to the action of the solvent.

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CINCINNATI 22 OHIO



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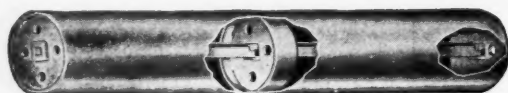
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 Besides our well known Standard and Heavy Duty Constructions,
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Malayan Rubber Statistics

The following statistics have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W.C.2, England.

Ocean Shipments from Singapore and Malayan Union—In Tons

To	August, 1946		September, 1946	
	Sheet and Crepe	Latex, Concentrated Latex, Revertex (Dry Rubber Content)	Sheet and Crepe	Latex, Concentrated Latex, Revertex (Dry Rubber Content)
Argentina Republic	100	.....	805	.....
Australia	1,620	.....	1,679	.....
Belgium .....	.....	.....	1,000	.....
British India .....	.....	.....	1	.....
Canada	4,275	.....	.....	.....
Chile	200	.....	.....	.....
China	607	.....	.....	.....
Cuba .....	.....	.....	295	.....
Denmark	998	.....	.....	.....
Finland	272	.....	.....	.....
Hong Kong	1,570	.....	1,290	.....
Mexico .....	.....	.....	820	.....
New Zealand	60	.....	43	.....
Sweden	675	.....	210	.....
Union of South Africa	3,965	.....	3,210	.....
United Kingdom	33,561	495	11,954	622
U. S. A.	29,326	.....	35,641	.....
TOTAL	77,229	495	56,957	622

Foreign Imports of Rubber in Long Tons

	August, 1946		September, 1946	
	Dry Rubber	Wet Rubber (Dry Weight)	Dry Rubber	Wet Rubber (Dry Weight)
Singapore Imports from				
Banka and Billiton	26	.....	2	15
British North Borneo .....	.....	.....	715	9
Brunei .....	.....	.....	124	.....
Dutch Borneo	1,299	306	995	127
Java	63	.....	.....	.....
Other Dutch Islands	46	17	65	10
Rhio	834	9	664	16
Sarawak	4,811	36	3,763	43
Siam	18	5	37	.....
Sumatra	9,203	2,980	7,651	1,688
TOTAL	16,300	3,353	14,016	1,908
Malayan Union Imports from				
Burma	161	.....	160	.....
Siam	276	4	821	8
Sumatra	1,437	179	1,891	213
TOTAL	2,174	183	2,872	221

Singapore Dealers' Stocks August, 1946

Total all grades of rubber

Port Stocks:

Harbor Board, Malayan Railways Goods Sheds, and Other Port Stocks

Singapore, Malacca, Penang and Province Wellesley Dealers' Stocks—September, 1946

Total all grades of rubber

Port Stocks—Singapore and Penang

Harbor Boards, Malayan Railways Goods Sheds, and Other Port Stocks

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(Continued from page 435)

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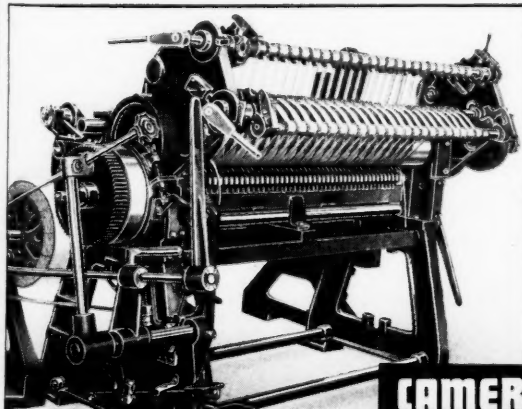


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(Reg. U. S. Pat. Off.)

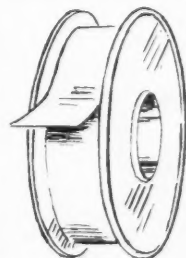
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SITUATIONS WANTED

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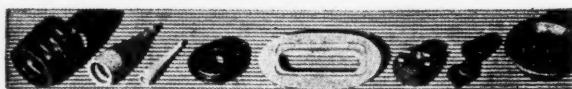
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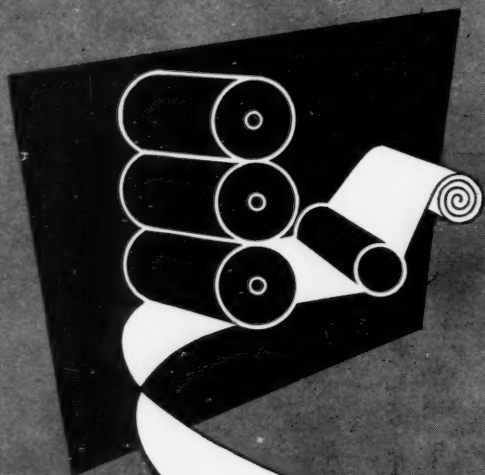
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This paper may be obtained in any width up to and including 54", and is furnished in rolls of 9", 11½", 13", and 15" diameters; put up on 3" i.d. cores. The yield is approximately six square yards to the pound. A 9" roll contains about 375 linear yards and a 15" diameter about 1150 linear yards. Investigate Linerette now. Write for samples, specifying width desired.

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